THE INTERNATIONAL ANNUAL

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THE INTERNATIONAL ANNUAL OF ANTHONY'S PHOTOGRAPHIC BULLETIN

EDITED BY

FREDERICK J. HARRISON

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PREFACE.

The International Annual for 1895 claims the attention and consideration of the photographic public. Never before in the history of Photography have so many prominent authorities contributed to one publication. In almost every part of the globe practical men have interested themselves in this unique volume and have willingly extended a helping hand. To all who have thus assisted most hearty thanks are tendered.

In the matter of illustrations the high standard of excellence set last year has more than been maintained. Many of the leading photographers of America have favored us with examples of their work, and their efforts have been ably seconded by those engaged in the photo-reproduction processes. The illustrations may be fairly taken as representing the position of photography and photo-engraving at the present day.

The publishers, as usual, have done all in their power to make the volume a notable one.

To all who have helped in the work—most grateful thanks.

Frederick J. Harrison.

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Aristo-Platino.

Aristo-Platino supplies the demand for a printing-out matt surface paper in a manner never thought possible. Easier to work than albumen paper ever was, the most wonderful effects may be obtained with it. Treated according to the instructions furnished with the paper, a magnificent tone, having all the beauties of a platinum print, with added detail, is easily obtained. The most prominent photographers in the country express themselves as delighted with it, and the fact that prints on it won all the big prizes at the 1894 photographic conventions demonstrates that the judges, who were selected from the most prominent photographers, were satisfied that the best qualities of the negatives were reproduced on this printing-out paper in a manner absolutely unapproachable on any other make of paper.

The frontispiece to this volume of the ANNUAL is on this paper and is printed from negatives made by Falk of New York. Only one, of course, goes with each book; but every one of the many thousand prints sent us was perfect. In one batch of 1900 prints, toned in four hours by one man and an assistant, but two were discarded after toning.

Mounted on the so-called platinum mounts, Aristo-Platino Prints are without equal.

For full directions for using Aristo Platino, see next page.

Directions for using Aristo-Platino.

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For warm or sepia tones use the plain gold and water toning bath, made slightly alkaline with saturated solution of borax. For black tones use the following toning bath:

Water	60 ozs.	Chloride of ammonia	20 grains.
Sulphocyanide of ammonia	1½ oz.	No. 3 gold (Aristo)	1½ dram.
Acetate of soda	1½ oz.	Or, if chloride of gold is used	10 grains.
Powdered alum	1 oz.		

Neutralize the gold with precipitated chalk before adding to the bath. Allow to stand two or three hours before using. This bath may be used repeatedly by adding a little gold as required to keep up the strength. Do not add more than a third of the original amount at a time. Tone until all traces of warmth are removed from the deepest shadows.

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Tone in the last bath until the warmth is entirely out of the shadows.

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Make fixing bath in proportion of one ounce hypo crystals to twenty ounces of water. Fix five minutes only, to avoid bleaching.

FINAL WASHING.

Wash one hour in running water, and mount in the usual way. Run prints through cold burnisher to shape the mounts.

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THE

INTERNATIONAL ANNUAL

OF

Anthony's Photographic Bulletin.

DECEMBER, 1894.

ARCHITECTURAL PHOTOGRAPHY.

By Rev. T. Perkins, M.A., F.R.A.S., Turnworth, England.

IN response to the Editor's request for a short article for The Annual, I will jot down a few notes on architectural photography, with special reference to that part of the subject which deals with those mediæval buildings which we in England too often undervalue and spoil by scraping, restoration, alteration, or partial demolition, but which, as a rule, our visitors from the other side of the Atlantic hold in greater reverence, probably because they have no such buildings in their own country. They moreover feel, since they, like ourselves, are descended from the men who built the old cathedrals, churches or castles, that they have a kind of inheritance in the work of their and our common ancestors, and consequently take a warm interest in it.

Many of those who visit our shores and bring cameras with them may like to carry home with them some negatives of these memorials of the past. The first thing for them to do will be to study the outlines of Gothic architecture, choosing such a handbook as Rickman's celebrated treatise, or the handier sized volume by Parker, or some book on the subject written especially for photographic readers. After a few weeks careful study, they will have some idea of what to photograph, what point of view to choose for each picture, and, what is almost as necessary, what to leave alone as uninteresting and worthless from an architectural or historic point of view.

The exteriors of cathedrals and churches, whether taken from public roads or from the cathedral close or the church-yard, may generally be photographed without any special permission. But before attempting to photograph the interior of a cathedral, permission must be obtained of the dean, and the best method of procedure is to send to him a few days beforehand a letter containing a stamped and directed envelope for reply. The reply will generally contain a permission to photograph, which must be shown to the verger in charge of the building. In the case of a church, formal permission is not so necessary, but a call at the rectory with a request for the key, should the church be locked, and a statement of the purpose for which it is wanted, will generally be received in a courteous manner. Permission having been obtained, the next thing is to decide what pictures to make; a general view will probably first be taken, and then the more interesting part of the work, namely, the photographing of particular parts, will begin, especially if the photographer is working in some cathedral or other large and ancient church. The tomb of some crusader or prince or bishop, the richly carved screen or pulpit, a single pillar, arch or doorway, the font or altar, will often attract attention, and call for the exposure of a plate.

The two great difficulties in interior work are, first, deciding the right length of exposure, since the light, owing to colored glass in the windows, is often deceptive; and secondly, halation caused by bright windows. The first difficulty may be met by making duplicate exposures on the same subject for different lengths of time; but if this method should be impracticable from scarcity of plates or time, it is well to err on the side of over rather than of under-exposure. The second difficulty may be got over by the use of backed films, or by selecting a point of view from which any specially bright window cannot be seen, or by choosing that hour of the day when the window is least brightly illuminated. Bright windows not only cause halation, but are apt to get much over-exposed, even to the point of reversal, for which, as far as I know, no cure exists; but the effects of over exposure not reaching this stage may be greatly reduced by having a ten per cent. solution of bromide ready poured out and a camel's hair brush in the dark room, and by painting the window with the bromide as soon as the first traces of it are visible on development. By this means I have obtained good negatives even on unbacked glass plates. In developing it is well, while keeping to the normal proportions of pyro, bromide and ammonia with respect to one another, to reduce the strength of the developer by using twice or three times the ordinary amount of water; this will allow the image to appear slowly, and give time for careful development. The object is to get full detail in the shadows before the high lights are blocked up, but at the same time to guard against flatness. A bright, sunshiny day is not the best to choose for interior work, since it tends to give harsh contrasts, and if any direct sunlight falls on a light colored wall

Negative by Rev. T. Perkins.

DOORWAY TO CHAPTER HOUSE, SALISBURY.

or floor this spot is sure to be hopelessly overdone before the deep shadows have received sufficient exposure.

The last year or two has made interior work much easier in one respect, for now we have lenses which with large apertures give good marginal definition in a way that ordinary R. R.'s and W. A. R.'s do not. I have found the Zeiss Anastigmats and the Goerz Double Anastigmats invaluable for interior work; of the two I personally prefer the former, their slightly less flat field being amply compensated for by greater equality of illumination. A stop of $\frac{f}{9}$ or $\frac{f}{12.5}$ generally gives excellent sharpness over a 5x4 or $6\frac{1}{2}$x$4\frac{3}{4}$ plate with a lens of 5 or 6 in. focus. Of course, if there are objects in the immediate foreground, and others at a considerable distance, these lenses must be stopped down to obtain depth of focus, but stopping down in order to get marginal definition is not required to the same extent as with ordinary doublets. So that, as a rule, the exposure may be reduced very considerably by the possibility of using a much larger stop. I find a lens of focal length rather less than the longest side of the plate the most generally useful for interiors.

Domestic architecture must not be overlooked, though here certain difficulties will be met with that do not occur when churches are photographed. The photographer will generally have to be content with exteriors, and if these are to be taken from private grounds, courtesy demands that the occupier's consent should be obtained. Occasionally facilities for interior work may be offered, but as a rule to get satisfactory pictures of ordinary rooms some rearrangement of furniture will be needed, and obviously this is a thing that the occupiers of the houses may not be willing to allow; but apart from interior work, much may be done in the photographing of historic ruins, mediæval castles and Tudor dwelling houses, old manor houses, many of which are now used as farms, and even the humbler thatched cottages which give such a charm to many of our Old World English villages.

HAPHAZARD.

By Abraham Bogardus, Brooklyn, N Y.

It is not a pretty word. It has more meaning than beauty. Webster defines it as chance, venture, risk, jeopard, peril. The word should not have a place in the photographer's outfit. Careful, successful workers *never* adopt it. If there is an operation performed by man requiring care, skill, judgment and forethought in every part it is the execution of a photograph. The want of these has filled the world with trash. The man who works at haphazard has missed the focus, admitted light on his plate, or made the impression on (or off) one side of the plate. We have all heard of the fellow, who, on finding his picture on the side of the plate, scolded the sittee because he did not "sit in the middle."

The haphazard rail-splitter cuts his foot. The man who sails his boat at haphazard may find himself sitting on the keel, anxious to be taken off, and decidedly averse to having the waiting sharks do it. The man who puts the harness on his horses at haphazard may find himself unable to hold a runaway team.

The dry plate makers have made fortunes from haphazard workers. Thousands, probably millions of plates have been bought, paid for, used and spoiled by that happy-go-lucky formula. In photography the real meaning of the word is carelessness. Carelessness in any business or profession is detrimental. In any one part of the execution of the photograph it damages the picture to the experienced eye. The haphazard may strike right occasionally, but his work cannot be depended on for excellence or uniformity.

Some men dress at haphazard. That great writer and leading politician Horace Greeley once came for a sitting. His collar had loosed from its moorings, and his necktie was around under his ear. In instances without number the wife came with her husband to insure his being presentable before he entered the operating room. She would say, "I am compelled to look him over before he leaves the house, he dresses at haphazard."

After his terrible ordeal at New Orleans Admiral Farragut sat for his pictures. He carefully arranged his dress (uniform) before the glass, and was very particular that every part should appear perfect. General Hancock did the same. President Arthur was also very particular. Wendell Phillips walked back to consult the glass several times before taking the chair for a sitting. In dressing there is a "happy medium" between being finical or careless. Ladies sometimes refused a picture perfect and satisfactory in position and expression, because the most insignificant ribbon on their outfit did not hang as they thought it should, or because a bit of lace did not point according to Worth's latest interpretation. Let us go back to picture making.

I did know one professional who *seemed* to work carelessly; but he was a perfect master of his profession and it was *only* seemingly. He went through the whole transaction easily and apparently without forethought; you expected a failure. Not so, he saw everything, and succeeded in getting what he intended, with as much certainty and uniformity as any man I ever saw work a camera. He did it without making a "fuss," so often annoying to the sitter. It is not the man who always makes a parade of himself in the presence of sitters who is the most successful. On the contrary, I have known instances where the operator gave the sitter to understand "Now there is going to be something done; I am here MYSELF." Result—the mountain's mouse was *thin* as well as *small.*

The public will soon give the careless professional as much leisure time as he could wish; he will find they will have little or no use for him. Painstaking is appreciated by those who are themselves careless.

To the amateur who is inclined to work at random, trusting to what he calls luck, I would say: You will never be a success except at spoiling plates. Do as the exquisite did. When congratulated on the perfection of his neck rig he said, "I gave my *whole mind to it.*" Make fewer exposures, and to each give strict attention and care; make every plate produce a "gem." Then your work will be a credit to yourself and a gratification to your critical friends. Noah's old adage applies here, "What is worth doing, is worth doing WELL."

It is no credit to any person who *counts time by seconds*, to spend *hours* in producing something as valueless as it is unsatisfactory.

"Haphazard" was the son of a Mr. Slaughter, his mother was one of the Miss Slipshods, from Rattle Brain Hollow. His sisters were Sloven, Slouch, Slat, and the oldest, Hurry. "Hap" had one brother, his name was Ruination. It was not a popular family; they were only endured when a *risk* or *venture* proved successful, and gave them a flash light measure of prosperity.

WANTED.

BY DR. H. VALENTINE KNAGGS, LONDON, ENGLAND.

DEAR READER, when perusing the above heading pray do not conjure up any awful visions of boodlers, mugwumps, train robbers, or anything incident to the red-paint business. The heading here has nothing appertaining to that undesirable section of the community, but should be referable, if you please, to something the world hasn't yet got, to something which the world ought to have, to something which will immensely benefit mankind in common, and the photographic part of it in particular. The thing to which allusion is made is a (supposed) structureless, transparent, mineral compound to take the place of the gelatine and albumen of the animal, or the collodion of the vegetable kingdom.

The time must come when such a compound will be produced. Facts are all in favor of its discovery. That a missing link of this kind lies buried in coal can hardly be denied, and that its discovery will clear up the natural color problem is my firm belief.

Just consider now what a marvelous substance coal is, just think out for yourself of what it is actually composed. In prehistoric times, in a warm and humid atmosphere, there were vast forests of pine and fern trees. Through countless ages the accumulated débris of these forest tracts was subjected to compression and mineralization. Hence, coal is really nothing more than fossilized vegetable matter, or, in other words, compressed and bottled-up sunshine. It is built up like all vegetable growths from the primary colors of the sun's actinic brightness.

Every year something new is found out as to the by-products obtainable from coal. It is not so very long ago that the liquor of the gas works was allowed to run to waste. Now it is said that, even if no gas at all were sold, the by-products would pay for the necessary workings of a gas-making factory. As new substances are found so the value of the waste liquor increases.

We have acetic acid or mineral vinegar, carbolic acid and coal tar oils as forms of fossilized creosote or wood tar; saccharin, a substance two hundred times sweeter than sugar; antipyrin, phenacetin, and many other fever and pain-subduing drugs as substitutes for quinine; hydroquinone and other photographic developers in the place of pyrogallic acid, to say nothing of coal tar, bitumen, benzole and a host of valuable commercial products.

Surely a substance containing, in a compressed and matured condition, all the essentials of stored-up sunshine has yet many secrets left to be unraveled, especially by photographic scientists. Coal yields products in the way of the aniline dyes of every possible hue and tint, which are not merely analogous in composition to the chlorophyl of vegetables but are probably derived from it. It also produces in bitumen a substance sensitive to light. Where is the analogue of collodion? Where is the gelatine of coal? and, most important of all, where is the crank to solve the problem of how to get at it?

Cotton is a very opaque substance until, by suitable manipulation, it is transferred into collodion, and so is gelatine before it is boiled out of the various animal structures of which it forms a part. Soap, too, when first made, is opaque enough, but if a bar of common yellow soap is dosed with alcohol, sugar and resin, and subjected to sundry manipulations dear to the heart of a soap-boiler, it becomes transparent and structureless.

We shall yet discover, I am firmly convinced, a mode of treating bitumen, benzole or some coal product whereby a transparent, coagulable, structureless, collodion-resembling body is obtained. But to expedite matters, perhaps some American reader of this rambling article will whisper this want into the ear of the only Edison, or some other talented inventor.

FLOWERS.

By W. Cooper, Frome, England.

TO write anything new for an annual is a big order, in fact, too big for most contributors, and I admit it is to me; and although much I might send might be new to many, still to more it would be stale, for, after all, we can only write for a portion of the vast army of amateur photographers, and with this feeling I venture to send this contribution.

Many amateurs living in the country, and enthusiastic workers, after a time have photographed under various conditions both as to season, point of view, time of day and light, all the takable views in their district, and still wish to pursue their hobby, but do not know what to take. To such I say, photograph flowers. This will give a good scope for your artistic taste in many ways, and what I personally have a weakness for is an arrangement to be afterward made into lantern slides, and in this way some most charming things can be obtained, as all who have seen a good flower slide will admit.

What to Photograph. Almost anything; but bold flowers show up best, and re-collect and group them not for the colors as seen by the eye, but as they will be in a print or on the slide.

I have made some very pretty slides of arum, lilies, roses, pear blossom, apple blossom, horse chestnut, iris, chrysanthemums, and a variety of others comeatable to all.

Arranging the Flowers. The looser this is done the better the effect, and they may be put up in either vases or baskets, or otherwise as taste may suggest; but whatever you do be perfectly satisfied with the arrangement *as it appears on the focusing screen* and not to the eye, and this is one of the secrets of success, as what you will think a very pretty arrangement (to the eye) when seen on the screen is often most disappointing and seems too crowded.

Background. This should be of some plain color. I find a good dark slate very useful, and it must be far enough away to be out of focus. If not large enough for this, keep it moving all the time you are exposing. If you have not a proper background, a carriage rug comes in very handy as a makeshift.

The Lighting must be carefully attended to, especially with white flowers; say a large window on one side of object and a reflector on the other, and for this a swing toilet glass answers well, as you can put it anywhere, and by elevating the plate (the glass) to any angle you want, get the best result.

Plate and Developer. Isochromatic plates give the greatest gradation, and are best to use; and the developer—well, as there are so many in the market, I say use your pet one; mine is the old 10 per cent. Pyro.; do not make the negative too hard (use as I recommended in THE ANNUAL last year, page 198).

Finally. By taking up this branch of our mutual hobby, you can be keeping your hand in all the year round; you are independent of weather, the flowers can be used, after you have taken them, for decorating your rooms, the prints make pretty Christmas cards, and the slides, if you make them, will also give you many a pleasant hour's amusement.

Negative by W. Cooper.

OLD COTTAGE AT REEVIL, WILTSHIRE.

THE ADVANTAGES OF A PHOTOGRAPHIC EDUCATION.

BY HERBERT O. WARNER, HARTFORD, CONN.

AS it is a good idea, once in a while, to go on a prospecting tour without a camera, so it is a good idea to occasionally shut the dark room door on our failures (and our successes) and look about to see what benefits we are receiving in a general way.

The advantages of a photographic education are many and one's store of knowledge is greatly increased in various ways beyond what is learned of developing and printing. The beginner, naturally, cannot see beyond the rows of bottles of developer, etc., in his dark room, and "pyro" and "hypo" run through his head until he is in doubt as to whether he ought to use hypo to give density or mix pyro and alum for a hot weather fixing bath. After a while, as he gets beyond his early difficulties, he finds that photography is helping him to see a great deal that he had never before noticed in the world. We must suppose, for one thing, that he had a certain liking for pictures or he would not have cared to try to make them. He finds now that his tendency is to look more critically at the pictures he has at home and at those on the walls of his friends' houses. He learns, before long, to tell the difference between the different kinds of pictures in black and white—etchings, engravings, process pictures, etc.—which is a long step in the right direction for some people. Paintings in color are, perhaps, more difficult to study understandingly than those in black and white, as far as the results possible to obtain by photography go, but their study gives much pleasure, their composition can be adopted by the camera worker, and a generally higher art feeling will result and show itself in future work. If the work produced is not art, as some contend, it is certainly a reaching out after art and the world is better for it.

How much more he enjoys the magazines and illustrated books. The pictures are no longer hurriedly passed over, but critically looked at, and much pleasure is had in being able to tell *why* a picture is well composed and restful and *why* another is not.

In the photographing of architecture how quickly the value of light and shade will be seen, how much study can profitably be given to a house, and, when its good points are finally brought out, how much one has learned of composition as applied to architecture.

There is another direct benefit derived from photography which is felt in one's appreciation of the correct arrangement of interiors. It trains the eye and hand to look for and bring about artistic and restful results. Composition, balance, light and shade, and harmony of colors may be applied to the arrangement of a room as well as to a picture, and I venture to say that the young photographer is beginning to see a difference in interior arrangements, before unnoticed, and will soon know the why and wherefore.

And then there is the study of nature. How much one unconsciously learns of various branches, such as botany and geology, to say nothing of perspective and other things of direct value. Many people go through life without a just appreciation of the beauties of nature. It is a sealed book to them and they cannot appreciate it because their perceptive faculties in that direction have never been cultivated. If such a person could be persuaded to take up photography this world would look like another place to him. Photography may be considered a blessing to humanity on this account, without reckoning how much it has contributed to the advancement of science.

MONOCHROME PRINTS.

By Maximilian Toch, New York.

THE methods I propose to enumerate are by no means new, as every chemist who is acquainted with the manufacture of pigments will readily recognize the processes applied as analogous to the principles of color making.

The basis started from is to obtain a print on paper which has been immersed or floated in a solution of potassic dichromate and well dried. After the image has thoroughly appeared (usually a ten minute exposure in bright sunlight will suffice) the print is well washed.

To obtain a black effect, which will resemble a lithograph, place the print in a solution of ferrous sulphate. Wash thoroughly again and tone in a solution of tannic acid and the desired shade will rapidly appear.

If extract of logwood be substituted for tannic acid purple brown tints will be the result.

If chloride of tin be substituted for the ferrous sulphate, and after that, extract of hypernic wood used as a toning agent, rich maroon shades will be the effect.

To produce an orange tone proceed with the potassic dichromate (known commercially as bichromate of potash), as in the first example, then float in a solution of lead nitrate, and after washing thoroughly tone in a weak solution of caustic potash.

The success of all these operations depends entirely on the washing, for if a trace of chemical be left in the fibers of the paper the next chemical in which the paper is floated will spot that part which has been poorly washed. Nor is it good to wash the prints in a forcible stream of running water. The colors are precipitated by the chemical action, and too much force in the water will dislodge the particles and weaken the impressions. Prints made in the fashion just described are permanent, and fabrics of all kinds can be easily and inexpensively decorated with portraits or scenes.

THE FERRICYANIDE TEST FOR IRON SPOTS IN NEGATIVES.

By Milton B. Punnett, Jennings, Mo.

SOME time ago portrait negatives, marred by a number of small black opaque spots, were handed to me for examination.

The spots, under the microscope, showed the silver grain even in the densest portions, where they had a slight rust-like tinge. Both strong and weak hydrochloric acid applied by means of a small platinum wire loop and followed by an application of ferri and also ferrocyanide of potassium gave no satisfactory reactions, but when the loop was first dipped into quite strong hydrochloric acid, then into the ferricyanide solution and applied, they gave the unmistakable blue reaction and the acid did not destroy the film.

SPOTTING PRINTS.

By H. M. Beeles, Great Valley, N. Y.

SINCE I received a formal invitation to again contribute to the pages of the International Annual I have hesitated, not so much for the want of a subject as for one that might be of real value to a large class of aspiring photographers who do not imagine that they have already passed the point of further progress, and hence need no advice.

While thus hesitating and in grave doubt I chanced to arrive one day in one of the new fledged cities of the Empire State, where necessity compelled me to wait awhile for an outgoing train. As my time was too brief to visit the various studios I contented myself with rather critically examining the pictures exhibited at the various entrances.

I will confess here and now that I was disappointed, for I had often heard that in some of these galleries fine work was turned out. I found, if I may judge by the street display, that, while taste was displayed in posing and lighting, and good judgment in development of the plates, and the printing and toning creditable, both the retouching and the spotting of the prints at all the galleries alike showed the want of the careful, painstaking touch of the real artist-photographer. And here I got the text for this article—spotting prints.

I need say no more in regard to retouching than what every experienced photographer knows—viz., good retouchers are few and hard to obtain, but a few hints on spotting ought to help even these *city* photographers. Especially is this true in these days of collodio-chloride and gelatino-chloride of high burnish or glacé finish, for, no doubt, albumen is doomed to go the way of wet plates and tintypes.

First, then, don't spot if you can avoid it, and largely you can. I would rather make a negative several times over than to do very much spotting.

Second.—In retouching, avoid as much as possible depositing lead or metal in spots or specks.

Third.—Before putting on *each* and every piece of paper dust your negative, and here is a dodge not only worth knowing but worthy of practice. Take the negative (printing frame and all) in your left hand and hold it upside down, so you can dust from below. Better for this purpose use a soft cloth—a well used handkerchief, for instance. Reason: brushing or wiping a negative charges the surface with electricity, when it at once attracts to itself every particle of dust within a certain distance. Now when the negative is face down the attraction of gravitation in the first instance helps to overcome the tendency of the particles so to deposit themselves; and, secondly, as all who are versed in physics know, as soôn as electrical equilibrium is restored there is a tendency to cast all these particles off again, which also the reversed negative favors. This action will occur so soon as to cause no appreciable loss of time, and will save a great deal.

Fourth.—Many will call this heresy. Spot after you burnish! You must do this after a glacé finish. If you wish to keep a high gloss over your spotting, carefully lay over it a gelatine, a gum arabic or a thymol finish. A little careful practice with a fine brush will make your work perfect. Why do I recommend spotting after burnishing? Chiefly because the ink or medium becomes darker when you burnish and also because of the liability of the ink or color to move.

Fifth.—Use india ink toned to color of prints. I find nothing better for this purpose than crimson lake (moist color).

Sixth.—Use a very fine sable pencil brush—no fear it will be too fine. Get as little ink as possible in the brush and go slow and with the most delicate touch, being sure to touch just the right spot; and here is the difficulty. Do not say you cannot, for you can.

You may think, you may even say, that I am making far too much of a small matter, but a quarter of a century nearly in the active practice of my profession has taught me, that had I known as well the importance of small things at the beginning of my career as I know and recognize them now, I might have been far better off.

Again it may be as well to recognize the fact that the nineteenth century has taught the public what a good and artistically finished picture is, and that the twentieth will demand the best and will accept no other. It is true that for a long time to come the ordinary photographer may not raise over his studio the tri-color of polychromatic photography—that while a few Kurtzs and Gutekunsts may produce some effects in natural colors pleasing to the eye, perhaps, for a long time yet the monochrome of the present day will in some form be the popular picture. Let us then spare no pains to arrive as near perfection as possible.

WARWICKSHIRE.

By Signor Aspa, Leamington, England.

OUR gentle editor having again done me the honor to request a few paragraphs for his splendid Annual, again I take up my parable in the endeavor to show how rich in archæological interest, in addition to its picturesque beauty, is this "Garden of England."

It was mentioned last year how my society had undertaken the pleasant and useful work of photographing the ancient relics that abound in these parts. Much has been done, but much remains as yet untouched, the field of work widening as it is explored. Apart from photographic use, scraps of knowledge, possessing intense interest to those of us who like to know the history of the land in which we live, are continually cropping up. For instance, within the last few years a laborer, digging foundations for villas in this very town, broke into an earthen jar filled with bronze and copper coin that had not seen light since the Romans left us. The man tried to change some for beer with but indifferent success, so threw part into the muddy roads, and the rest into a heap of mortar. Many of the coins when recovered proved of great interest, but what is still more interesting is that the site of this find—the Rugby Road running through Leamington on the north—was beyond all question a well frequented highway during the Roman occupation, running from Droitwich in Worcestershire to Tripontium, a few miles from Rugby, and by it the salt found at the first named place was carried far and near, north, east and west.

Among my American cousins who visit this country there must be many to whom English history is familiar, and to whom those of its records preserved in stone in our noble castles and cathedrals will have peculiar attraction. But, besides these imposing structures, which everybody visits and photographs, we have no end of picturesque remains of smaller churches and monastic buildings which make lovely subjects, but which are only too often passed unnoticed. For example, on the way from Liverpool or Manchester to London, by our North-Western Railway, one passes, between Stafford and Rugby, the ancient town of Atherstone. Anyone who cares to alight there will find within a mile of the station some charming subjects in the church and ruins of the Cistercian Abbey of Merivale. The principal remains are portions of the refectory with its reading stall, from which the homilies were read with which the monks' meals were seasoned; some excellent doorways in fair preservation; considerable traces of the conventual buildings all around; the gate house and the chapel

Negative by S. Aspa.

PORCH TO REFECTORY OF RUINED ABBEY, MERIVALE, WARWICKSHIRE.

adjoining, which now serves as the parish church. In this some interesting tombs will be noted that were removed here, it is supposed, from the Abbey church at the reformation. Some of the buildings date from the reign of Stephen—others, Henry III or Edward I. In the chapel the decorated XIVth century style prevails. In the little church we find material that would fill a paper to describe. The perfection of work in the varied styles of architecture that in passing centuries have been tried is one of the things which will impress the observant visitor. On one side of the nave is a pure early English window, one of the prettiest I know, while the one opposite is Flamboyant—small, but excellent in workmanship. Just under the last is a door that may be early Norman, or even Saxon.

The porch is itself a picture. From it may be seen, on a hill in the park, Merivale Hall, the home of the Dugdales—a family beneficent and illustrious for ages. At the west end of the church yard lies one of them who only a few years ago lost his life in an endeavor to give aid to the sufferers by a coal mine explosion. Sir Richard Dugdale, born in 1605, is well known to historians and antiquaries as having written one of the very best of our county histories—"The Antiquities of Warwickshire."

Among your touring citizens there are many, I am sure, with culture and leisure to pursue and appreciate some of the byways of travel indicated in this and my previous papers. To such these lines are dedicated.

THE OPACITY OF GELATINE FILMS.

By R. Child Bayley.

Assistant Secretary to the Royal Photographic Society of Great Britain.

IT cannot be too often contradicted, for it is a very popular photographic fallacy, that the opacity and color of the gelatine film upon a dry plate depend only to a very slight extent upon the actual amount of silver present in the film, and in a much larger measure are governed by the physical condition in which that silver, as haloid, exists. That this is the case is exemplified in a very marked manner by two brands of English plates, samples of which are by me as I write. It is not to the point to say who are the makers of these plates, but in a recent investigation upon the amount of silver in various commercial brands, by Messrs. Haddon & Grundy, one of them came out almost at the top of the list as possessing the largest quantity of silver, and the other was equally near the other end of the table; one make of plate containing, by analysis, almost twice as much of the metal as the other. There is a slight difference in the color of the emulsion on the two makes, the richer plate being a little yellower and having a more glossy surface, but it is not very noticeable. What is remarkable, however, is that it is impossible by the eye alone to decide which contains the most silver. Since the amount of halation likely to be obtained upon a negative depends, to a large extent, upon the quantity of light transmitted by the film, it is obvious that we have here two plates, the results on one of which are as free from halation as those on the other. The speed of the two is very nearly the same, from which it will be seen that the makers of the plate which contains the lesser proportion of the metal have succeeded in making an emulsion which is as rapid and as opaque as that made by

THE HELIOTYPE PRINTING CO., BOSTON

STUDY BY DANA.

another firm, and yet only contains about half the quantity of silver.

The difference between these two emulsions would be generally set down to a difference in the proportion of iodide to bromide or in the molecular condition of the silver salts, and this is the case. A great many people, on being told that one plate contained twice as much silver as the other, would jump to the conclusion that it was necessarily twice as good, but this does not follow. It simply means that the one firm to do a certain piece of work (*i. e.* make a negative) find it necessary to employ a machine which requires twice as much raw material as that used by the other firm, and is consequently, as far as that raw material is concerned, twice as expensive. It remains only to consider whether the result on one of these plates is in any way better than that on the other.

As far as I can ascertain the answer to this question is "No." Far more density can be got on plates of either brand than is necessary in practice; both seem equally free from halation; their rapidity is as nearly as possible alike; in short, there is hardly anything to choose between them. Practically the same result is obtained in one case as in the other, which seems to point to the fact that the actual amount of silver is of a very secondary importance. Both the plates under consideration, however, show most unmistakable signs that they would be better for more emulsion upon them (I hope no one imagines that I have advocated starving the plates), since the image during development soon appears at the back. This is a symptom of the real effect produced by diminishing the opacity of the film by giving it a thinner coating of emulsion, which is the destruction of proper gradation in the high lights. In the highest lights when development has gone through to the back of the plate, the action ceases, but as it is still proceeding in the less exposed portions of the film, these gradually catch up to the highest lights, and the further development is pushed, the further down the scale is the disturbing effect carried. That this evil exists is seen at once, when photographs reproducing a long scale of lights upon thickly and thinly coated plates are compared, but at present experiment appears to show that the thick or thin coating referred to does not necessarily imply large or small quantities of silver bromide, but merely a greater or less opacity in the plate. Another way of putting this is by saying that two plates may be equally thinly coated although one contains twice as much silver as another, whence it follows that one plate may be more thickly coated than another and yet contain less silver, which, however startling it appears, is undoubtedly a fact.

TONING GELATINE PRINTS.

By Francis G. Eliot, Norbiton, England.

So many were the complaints made as to the irregular toning of gelatine prints by the separate toning and fixing process that a very large number of printers have given it up in favor of the one toning and fixing bath. Now this last process is certainly going back to old times, and was discarded long ago, it being considered impossible to know when pure gold toning ended and sulphur toning began. It is very well to take a few prints toned and fixed in a new combined bath and submit them to tests to prove their stability, and, consequently, the perfection of the system. But who will discard their baths when they have once been used and while they still contain enough gold, sufficient, or supposedly so, to tone a quantity more prints? Most persons will go on using them until it is impossible to declare whether the color is due to gold or not. In the separate process we are quite certain that without a proper supply of gold the prints will refuse to tone at all; but, at the same time, the process is quite valueless if the toning is not even, and especially if it gives two separate colors to vignetted prints, as is the case with the sulphocyanide bath if used improperly according to the usual directions.

Old hands can well remember what complaints there were when the acetate of soda gold bath was first introduced—mealy prints and all sorts of troubles, until it was thoroughly mastered, and it is precisely the same cause that is at the root of the sulphocyanide of gold troubles. Pour boiling water on the sulphocyanide and chloride of gold, and let stand till next day; or dissolve the sulphocyanide in the boiling water and directly add the gold solution. Use the bath over and over again, adding only a strong solution of gold with one-quarter the amount of sulphocyanide, or, better still, eight or ten grains of acetate of soda to each grain of gold made with boiling water a short time before using, when the toning gets slow, and no more complaints will be heard of. Of course the bath must not be used warm if the ordinary soluble gelatine paper is used; but there are several brands now in the market in which the gelatine is quite insoluble and would tone, although very slowly, in a warm acetate of soda or borax bath. The prints require well washing; they must be soaked and changed several times for at least a quarter of an hour, as the nitrate of silver is much harder to wash evenly out of gelatine than albumen, and will be apt to tone purple on some parts of the print while other parts are still in the red-brown stage. I cannot say I like soaking the prints in alum water before toning, although it prevents damage to the surface of the gelatine in handling, but after toning it is of great use to harden the film; it must be well washed out before fixing in the hypo, which must contain a small quantity of carbonate of soda, not washing soda or ammonia. I would caution any one against squeezing the prints on to talced glass or ebonite without well hardening the film in alum; in fact it is best to use it after fixing and washing, even if used before, as there is less chance of sticking and not readily peeling off.

WHAT'S IN A NAME?

By Rev. F. C. Lambert, M.A., London, England.

IN last year's volume a short article appeared (on page 79) under the above quotation title. I venture to offer a few words upon the same topic, since I regard an appropriate name or title for a picture as an important part of the "finishing touch." Although I have not had the pleasure of seeing the picture referred to in Mr. Williams' article, yet I can readily believe exactly what he says—viz., that the aptness of the title was a factor in winning recognition. It has been my lot to offer judgment at various society exhibitions, and the consideration of names and titles has been more than once forced upon me. Space here at disposal does not permit me to enter into the question as fully as I should like or it deserves, but perhaps it may serve a good purpose if I offer one or two very general and elastic suggestions:

First.—Let the name or title be truly appropriate—*e.g.*, if it be a line of poetry speaking of the beauties of a sunset take care not to apply this to a picture where the sunset effect and beauty are either conspicuous by their absence or of quite a commonplace or subordinate character. I have seen photographs of entirely commonplace and uninteresting, unpicturesque things and places adorned (?) by flowing, ornate, flowery titles; in short they were topheavy and upset—the result *bathos*, not *pathos*, much less poetry.

Second.—Try as far as possible in reason and consistency to avoid using titles or quotations that are too familiar, or are associated with some very well-known work of art. If you make this error you risk being passed over with the remark "same old thing," or, what is perhaps worse, you court failure by being compared to what has been generally admitted as *the* picture for *that* title.

Thirdly.—Where other circumstances support it, let your title be the poetic rather than the prosaic view of the matter, the sentimental rather than the comic. Very few pictures can stand a comic title. Again a line of poetry is just sufficiently general without being vague, so that the imagination is stimulated, and don't forget "*Imagination is the air of mind*" (Bailey's "*Festus*").

INTERIOR WORK—A DIFFICULTY OVERCOME.

By E. Hirst, Cleckheaton, England.

MANY amateurs will probably have discovered, when taking interiors, that there is a wide difference between getting all detail on the plate and producing a negative of medium density for printing purposes. An exposure of say half an hour may be quite sufficient

From original negative by Eli Hirst.

INTERIOR OF ADEL CHURCH, NEAR LEEDS, YORKSHIRE.

to get all detail out, but when the plate is developed it is found that the contrasts are so violent that it is impossible to get a decent print from it, and the amateur then wishes that he had exposed twice as long in order to reduce the contrasts. I have found this difficulty myself, and it is well to know how to overcome it, because it is not always lack of judgment which is responsible for the fault. Sometimes it is inconvenient to give the prolonged exposure which is necessary to secure a "soft" negative, and I have several times been content with a comparatively short exposure and rectified contrasts in the dark room at home in a way which I will briefly describe. If a prolonged exposure would have given the required gradations of contrast in the first instance it is only reasonable to argue that the same end could be obtained by making a transparency from the harsh negative and sufficiently overexposing as to tone down the objectionable contrasts which have been obtained. This I have proved by experience to be the case, and in one particular instance, where an exposure of three-quarters of an hour for the interior of a very dark church gave all the details but proved too short for printing purposes, I very successfully got over the difficulty by first overexposing a transparency and from that making another negative, the result being a satisfactory picture retaining every scrap of detail and preserving

From improved negative by Eli Hirst.
INTERIOR OF ADEL CHURCH, NEAR LEEDS, YORKSHIRE.

such contrasts as were necessary. I enclose for the editor's inspection a print from the original negative and one from the improved one made in this way. Since then I have occasionally resorted to this method and found it worked admirably.

I might add that the photographs, which are here reproduced in half tone, are from negatives of the interior of Adel church, near Leeds, Yorkshire, which was founded about 1140 A. D. The church was restored in 1877, but the Norman chancel arch is still perfect and is a most beautiful specimen.

The negative was taken with a quarter plate single view lens acting as a wide angle on a half plate camera.

ARTIFICIAL LIGHTING.

By H. Fourtier, Paris, France.

PHOTOGRAPHY, which owes its very existence to the sun, for only by the grace of his rays can it cause the images of objects to be impressed on our sensitive plates, has sought from its earliest days to arrogate to itself the powers of an Apollo. It must be confessed that the luminary, with its golden beams, does not penetrate everywhere; yet photography has ambitiously desired to reproduce everything, and how to succeed in those somber caverns where marvelous stalactites are hidden away, in those dark monuments of Egypt on whose walls the hand of man has left such wonderful tracery? It has sought aid from artificial light, first from the pyrotechnical combinations that enliven our public fêtes, and found it in a number of Bengal lights of suitable power. These mixtures generally were made up of a substance which furnished the necessary oxygen—first saltpeter, and later chlorate of potash—and a combustible to burn and to spread the flame. Charcoal and sulphur in fine powder answered very well. Then recourse was had to a flash, and sulphide of antimony was employed with success; but the flame had many drawbacks, a thick smoke resulting, and it being necessary to use a large quantity to obtain the necessary amount of light.

Gas was tried, jets of great intensity being used, and later the Drummond light gave better results. The Auer and Clamond jets, which interpose in the flame indestructible oxides, may here be mentioned. Electricity, the light of which, especially the arc light, is so rich in rays of all kinds, was used with much success, and Van der Weyde conceived the idea of shading from the subject the direct rays, and claimed that with the rays diffused by a large parabolic reflector, lined with white, the best results were obtained. This was introduced into France by Liebert, under the name of the American process.

Other experimenters endeavored to use the illumination obtained by certain chemical reactions, such as sulphur burning in oxygen, or the flame of the vapor of carbon bisulphide mixed with nitric oxide. These flames possess considerable actinic power, but they have the great disadvantage that suffocating sulphurous vapors are produced.

Soon a metal, magnesium, appeared on the scene, burning with a magnificent and very actinic light, and photography by artificial light became practical. The metal was first a costly article, but the big demand soon produced low and reasonable prices. Magnesium is used in three distinct forms—first, pure metal, in the form of ribbon;

second, pure metal in powder, burnt in special lamps; third, in pyrotechnical compositions, in which form it is known as photo-powder or rapid compound flash powder. Magnesium ribbon is burnt in special lamps, so arranged that by clockwork the ribbon is fed into a flame. By this method a brilliant point of light was obtained, but the shadows were too strongly accentuated, and efforts were made to overcome this by moving the lamps about during exposure, and by using several lamps. The results, however, were still unsatisfactory. The pure powder lamps consist essentially of a tube containing magnesium powder, and a rubber bulb for projecting the powder into a flame. I think, after personal researches, that this method was first indicated in America; however that may be, it is in that country that the largest variety of lamps has been designed. The lamps for pure powder give very good results; but as they can only burn a small quantity of powder at a time they cannot illuminate large areas, and then again the flash is not sufficiently rapid, and the subject, surprised by the brilliant light, has time to move. From this point of view the compound powders are superior. They give a real flash—that is, allow the taking of an instantaneous negative. In a series of trials that we have just undertaken with a very small apparatus, we have been able to ascertain that a flash powder gives a flash of only six to ten one-hundredths of a second duration. Many formulas have been given for flash powders, but our trials have led us to conclude that the best compound powder consists of magnesium and chlorate of potash only, in the proportion of sixty parts of magnesium to forty of the potash. These should be mixed in a sieve, after having been separately pulverized. This advice must not be disregarded, as the mixture explodes easily when pounded. Serious accidents have occurred both in America and France. Other substances which it has been proposed to add to the above mixture, cannot but be harmful. Permanganate of potash accelerates combustion, but diminishes the actinism. Sulphur assists the burning but produces a suffocating smoke. Prussiate of potash helps combustion, but gives a poisonous smoke. After experimenting with over one hundred different formulas, published in the English, American, German and French papers, we are convinced that the mixture of magnesium and chlorate of potash offers the most advantages—rapidity of combustion, actinic flame, small volume of smoke and the minimum of danger.

Having arrived at the above conclusion, we ascertained whether the powder could be safely burned in quantity. Our experiments in this direction were very explicit. From one to four grams the intensity of the light increases in proportion to the weight of powder employed, from four to eight grams it decreases slowly, and from eight to sixteen grams rapidly. The latter is the maximum quantity that can be burned in a single charge. To use more is simply loss, for no more light is given. In this regard our experiments are very precise. We cannot here enter into detaiils. We are about to publish a book on this subject, giving the details of the method and apparatus employed by us. If the sixteen gram charge does not furnish sufficient light, a different method will allow us to solve the problem. We have, in fact, recognized that the splitting up of the one charge into small charges would yield better results. A charge of two grams burned at one time furnishes less light than two charges of one gram each fired simultaneously. We have experimented with the portioning of the charge in every possible way, and we have always found a considerable gain in light for a given weight when same is burned in several small charges. Moreover, in this way the flame thus produced occupies a large space, and the light being thus spread, the shadows are softer, the subject better modeled, and very remarkable effects may be obtained. This subject, which here we have only touched upon, is well worthy of the attention of students of photography.

A NEW CARBON PROCESS—PAPIER VELOURS ARTIGUE.

By Charles Gravier, Paris, France.

THE processes known as "carbon processes," are based on the following phenomena, as demonstrated by different experimenters.

The alkaline bichromates are yellow, and on being spread on paper are made brown by the action of light. (Mungo Ponton, 1839.)

The same salts, mixed with a colloid albumenoid or saccharine substance, become insoluble when exposed to light. (Fox Talbot, 1852.)

If a well-divided coloring matter is added to one of the above mixtures, it will be retained by the insoluble compound. (Poitevin, 1855.)

If the quantity of colored compound, spread on a clear (paper or porcelain) or transparent support is comparatively small, light will more or less easily penetrate it, and all the intermediate tones from white to the most dense will be obtained, and be visible either by transmitted or reflected light, according to the nature of the support.

Poitevin's primitive carbon process has been perfected by various experimenters, who have indicated their particular methods. The Abbé Laborde remarked, in 1858, that the inner surface of the coating spread on the support was not affected by the action of the light until after the outer surface, the result being that the former was not modified by this action. The method consisted in spreading on paper a coating of gelatine, colored with some inert matter, to which had been added a solution of some alkaline bichromate. After exposing this sensitive surface beneath a negative, the gelatine not affected by the light was removed with warm water (about 40 degrees Cent.). The results were imperfect as regards the half tones, and the process could only be used for drawings.

Abbé Laborde, in 1858, observed that the accidents were principally due to the fact that that side of the coating next to the support, which side he termed the "inner surface," was not acted upon by light until after the outer surface, and that, therefore, the former was not affected by this action if the exposure was insufficient. To avoid the disappearance of the half tones, which were lost because of the inner surface remaining soluble and detaching itself in the warm water, it was proposed to expose the sensitive coating by placing the *support* against the negative, that is, exposing through the support. The inner surface of the coating thus contained the half tones, but the thickness of the support militated against this method.

Targier, in 1860, and then Swan, in 1864, proposed methods that are to-day still in use, the object being to detach the sensitive film from its support so as to remove the *inner* soluble surface; but by this method the image is reversed, and to bring it to its true position a second transfer, similar to the first, is necessary. Briefly, half tones cannot be obtained without this previous transfer. Blair had, however, proposed to form the sensitive surface by the aid of two coatings, one a colorless one spread over the support, the other, a colored one spread over the first. The paper is sensitized by floating it on a solution of potassium bichromate. After exposure to light behind a negative, the image is stripped by placing the proof first in cold, and then in lukewarm water, and then removing the unaltered parts with a brush. This last process has not been generally adopted, probably because too vigorous brushing carried away the half tones. For almost sixteen years no improvement was made.

At the Paris Exposition of 1889 no little sensation was caused by a series of photographs in the French photographic section, some of these having the appearance of a vigorous crayon, and others of beautiful engravings. According to the notice under the frames, they were made by M. Victor Artigue, of Bordeaux, France, by a carbon process, without transfer, that is, stripped directly, by means of lukewarm water with the addition of the sawdust of white wood. The inventor made a public demonstration before the Societé Française de Photographie. He sent us a few sheets of his paper, previously exposed to light, and we did the developing of the image before the members of the Photo-Club de Paris, and a great number of amateurs, who were surprised at the results. Notwithstanding our request, and "almost our menaces," he refused for four years to sell his paper, and only about September, 1893, did he issue his prospectus. The paper was at once an immense success, but as he desires to manufacture it himself, the supply does not equal the demand.

The velvet paper is composed of two coatings; their composition is the inventor's secret. The one next to the paper support is colorless, the other is a colored pigment held in a glutinous substance. In appearance the paper is somewhat like wall paper, but the coating is so thin as to be translucent. In this state the paper keeps indefinitely. To sensitize it, a five per cent. solution of an alkaline bichromate (ammonium or potassium), is brushed over the back of the paper. It is left to dry in the dark, then exposed to light behind the negative for such a time as experience indicates. As a guide one can use a very practical and simple actinometer, based on the maximum coloration that bichromated paper assumes when exposed to daylight. The developing of the image is accomplished by suspending the paper from a wooden strip, with wooden or metal clips, and pouring, from a spouted vessel, lukewarm water over the coated side. The temperature of the water must not exceed 27 degrees Centigrade. To the water white wood sawdust is added, to make a thick mass. This serves as a liquid brush in removing the unaltered colored matter. These proofs can be easily retouched with crayon or India ink.

ON THE WRONG TRACK.

By Charles Reid, Wishaw, N. B.

THE dog, by his sagacity and keen scent, has often been of service in discovering missing property, and in the tracking of animals and even hapless human beings. It seldom happens that he is the cause of leading any one on a wrong track, or acting the part of the proverbial red-herring. Yet that he has been the means of doing so is shown by the following incident.

A gentleman called at my studio one day desiring to see me on business. My attendant inquired if he could not do instead as I was at my home. No, he replied, he wished to see me personally, remarking that he understood I was the party of the name of Reid, who had recently exhibited three days at Dumfries Show. On hearing this, I supposed that the gentleman might have seen three photographs of dogs I had exhibited at Dumfries, and perhaps wished to employ me to photograph his dogs or other animals, and I hastened to meet him. After a brief exchange of civilities, he informed me that he was an officer of Inland Revenue, and had been instructed to call on me with a view to having an explanation of the fact that I kept three dogs while I had only one license. When I admitted that three dogs of mine had been shown at Dumfries, he looked as if he had

FROM PHOTOGRAPH BY CHARLES REID.

got me into a corner, and doubtless thought that I had rendered myself liable to a conviction for keeping two dogs for which I had no licenses, but his look underwent a change when I asked if he would like to see the animals, because, I said, if you wish to have a look at them *there is one*, at the same time pointing to a large framed photograph of a Collie that happened to be in sight. The offer to show him the other two that were in the next room was respectfully declined. It is needless to repeat the remarks that followed on this unexpected explanation, or the conjectures as to how this ludicrous blunder could have happened. All that the officer could tell was that he had been sent on this errand by his superior, to whom he resolved to write and give an account of his unusual experience. When time had been allowed to fully realize the situation, we had a hearty laugh over it. After having a look round, he assured me that his visit was well repaid by a sight of the photographs, but that he must be going, as he had some fifty dogs to see about that day. Though he might not get so much diversion as the result of his inquiries about other people's dogs, I heartily wished him more success with them than he had had with mine.

PROGRESS IN PHOTOGRAPHY.

By Manly Miles, Lansing, Mich.

THE prospective growth and development of photography constitutes one of its prominent attractions for the intelligent amateur. With progress in acquired skill, from the development of his first plate to the mastery of the more abstruse technicalities of the art, he looks forward with satisfaction to the discovery of methods and processes that are far in advance of any present achievements.

Empirical methods will, in the first place, be followed as the most direct and available means of improvement; but a more intimate acquaintance with the various factors concerned will lead to a recognition of researches in pure science, as of the first importance in solving the complex problems presented.

In the march of progress there is an increased appreciation of the wider range of facts and principles of science that are made available, and the chemistry of photography is supplemented, and to some extent superseded, by contributions from the science of physics, which apparently indicate that the transformations of energy may transcend in importance the metamorphosis of matter.

The photographer is in fact dealing with the forces of nature, and he is directly interested in the laws and conditions that control and give direction to their activities. In surmounting the difficulties arising from the many complex conditions and interdependent relations involved in special lines of inquiry, the measure of success in the improvement of photographic processes must, therefore, depend upon a conformity to these laws which it is the mission of science to investigate.

The electro-magnetic theory of light, which is now generally accepted in connection with the wonderful discoveries made in the investigations of the Hertz waves, have furnished a plausible explanation of the physiology of vision and the discrimination of colors, which suggests possible relations to color photography that may have a practical value. It is not my purpose to discuss these relations, but to call attention to a promising field of investigation.

It is, of course, impossible to predict the influence of future discoveries in this direction, but the present activity of research, and the remarkable results already obtained, are full of encouragement to the practical photographer, and they should awaken an interest in pure science as the most fruitful source of the means of improvement in the art.

CARBON PRINTING.

By A. C. Champagne, Paris, France.

SIMPLE and definite transfer. Place the paper, on which is the impression, in cold water, with the gelatine side downwards. As soon as it lays flat, and before it curls back, place it face down on the transfer paper. Run over it a rubber roller to squeeze the two papers into contact, and to remove any air bubbles which may be present. Dab with a clean piece of linen to take off superfluous moisture, and suspend from a string to dry.

After ten minutes place the double sheet (carbon tissue and transfer paper) in cold water, to which add hot water, so as to bring the temperature up to 30 or 35 degrees Centigrade. You will then perceive a froth oozing out from the edges of the carbon paper; it is the under layer dissolving. When this froth has accumulated very distinctly, hold down the transfer paper under the water with a finger of the left hand, and, with the other hand, pull off the carbon paper. This must be done carefully, and the picture, though invisible, will be on the carbon paper. Take no notice of any white spots which may have appeared.

Hot water must now be added, bringing the temperature up to 40 degrees Centigrade. Turn the sheet so as to keep the gelatine side down, but be careful not to let it touch the bottom, as it would tear. Move the water constantly and lift the sheet from time to time and examine it. The picture will develop, that is, part of the gelatine will dissolve, carrying off the coloring matter. The picture is first vague, but gradually becomes clear and distinct. When no more coloring matter runs off the transfer will be complete. If the exposure time has been too long, the picture will develop with difficulty. It will be found necessary to bring the temperature up to 45 or even 50 degrees Centigrade, but we risk spoiling the whole work by reticulation and warping. The best and safest plan for over-exposures is to put them in water, heated to 50 degrees Centigrade, to which a little ammonium carbonate has been added—about two grains per pint. If the exposure has been insufficient, it is also bad, for the picture remains indistinct by not developing properly.

As soon as our proof is sufficiently developed, it must be cleaned by immersing for a few seconds in cold water, then laid for ten minutes in a saturated solution of alum and again washed in water. Then hang up to dry, and the work is over. If we have used a reversed negative the picture will appear properly, but if we used an ordinary negative the picture will be laterally reversed. For enlargements a simple transfer is used, for the negative to be enlarged is made reversed.

COMIC AND GROTESQUE PICTURES BY PHOTOGRAPHY.

By W. K. Burton, Imperial University, Tokyo, Japan.

PHOTOGRAPHY lends itself to the production of comicalities much more readily than may commonly be supposed, and a lantern evening with slides of a grotesque nature is a means of happily relieving the monotony of such meetings, the more especially if the show be of a semi-private nature—such as can be held at a club, for example—so that the comicalities may be of a more or less personal nature, without giving offence.

The means of making slides of the kind indicated are various. The following are a few of those that the writer has used.

The photograph of one whom it is wished to caricature is secured, and a negative is made from it, preferably developed by ferrous oxalate. No alum bath is used, and while the plate is still wet, after fixing and washing, it is held in front of a bright fire, till the gelatine just begins to melt and to run. The result is often a negative that will give a print that is a caricature of the original, in ludicrousness far beyond anything that the pencil or the brush can produce. Such a caricature is nearly always to be had after three or four trials, if not at first.

The absurdities that can be produced by "the abuse of the wide angle lens," are well known, and the effects may sometimes be made very amusing. As an example, an entertainment was recently given at a local club, of which a well-known brewer was a member, his beer being, in fact, the favorite beverage at the club. This gentleman was represented as holding forward, invitingly, a bottle of his own beer, the size of it apparently nearly as great as himself.

In producing such monstrosities it is necessary, if the full effect is to be got, to use a lens of the extreme wide angle type, and it is advisable, in practice, to use it with a larger plate than it will completely cover. As much of the middle part of the negative as is needed is then used.

Every one knows the absurd effect produced by the cylindrical mirrors that form a part of the entertainment at certain cheap shows. One looks at his face in one (the axis vertical), and sees an individual with elongated features of the most dismal type, in another (the axis horizontal), and sees his face broadened out with preternatural joviality. The same effect can be produced by photography without the aid of mirrors. All that is necessary is to place a portrait very obliquely, and so to copy it. Photographed from one side, the elongated face is produced, from top or bottom the face of great breadth. The result is sometimes indescribably comic. For obvious reasons, a long focus lens should be used in making these reproductions, unless it is wished that another form of distortion be also very perceptible.

The joining together of heads and bodies that were never joined in nature, is an unfailing source of the production of comicalities. The mere fixing, on a small body, of a head disproportionately large, has a ludicrous effect, such as we continually see in cartoons in the illustrated papers, comic or otherwise. An improvement on this is made by getting a friend to pose in absurd or even compromising positions. His head is replaced in the various photographs by those of other people. The more ridiculous the positions, and the more grave and reverend the individuals whose heads are used, the more absurd the effect. The only limit is the probable capacity of the owners of the heads to appreciate a joke at their own expense. Such effects are, as has been indicated, best suited for meetings that are not of too public a nature.

For the club meeting mentioned above, a somewhat ambitious attempt was made. Five figures in evening dress were posed, and in the first photograph they showed in a trim row, each holding a cup of tea in his hand. A clock in the background showed the hour to be 6:30. In the next slide the clock showed 11:05, and the five men were, to say the least of it, in a very "after-dinnerish" condition. In the third they were in a still more riotous state, going "home with the milk," and afterward were arrests and various other adventures. The heads of five of the committee of the club—supposed to be the most "influential citizens"—were selected to embellish the bodies. It was wonderful to see how thoroughly these respectable leaders of society seemed to enjoy the joke at the club, how very anxious they were to make sure that no copies of the productions should reach their better halves.

In composing illustrations of this kind the effect is heightened by having the heads to a somewhat larger scale—say 20 to 30 per cent. larger—than the bodies. An appearance of grotesqueness is given, and moreover, in case there should be any doubt, it becomes evident that the figures were not actually photographed from life, as they appear.

An extremely ludicrous effect may often be produced by taking one of these illustrations, commonly used for advertisements, representing an actress, or a lady of the *corps de ballet*, with an undue area of skin-tights exposed, or with the whirling skirts of a skirt dance, and replacing the head by that of a man. The result is particularly effective, from the point of view of the audience, if the man be peculiarly known as "a good young man."

There are various ways of turning out the composites described. I have found far the easiest way to be to re-photograph the heads and bodies to the relative scale wanted—preferably to a larger scale than that of the negative from which the slide is actually to be made—to cut out the head, and to gum it over the complete photograph, which is to be used for the body. It is almost necessary that this last mentioned photograph be mounted. I have found albuminized paper as good as any other, printing both the heads and the bodies. It gives a good surface for copying from—when properly illuminated—and, being thin, is easily cut up and pasted together. Any white edges of the cut paper that show may be blackened with a soft pencil, and additions may be made with a pen and common ink, or with a brush and India ink. Any difference in "tone" (the word is used in the photographic sense) is not reproduced.

It is my own custom to copy the composite, made by pasting the photographs together, to the size actually needed in the lantern-slide, so that this latter may be made by contact.

These are a few out of many methods that the writer has used for producing comic photographs; many others will probably suggest themselves to readers.

I have here left out of consideration the results of merely photographing the ordinary groups posed, or individuals dressed, with a view to comicality. Very amusing results can often be got in this way, but there is a liability to a stiffness that sometimes detracts from these results. The very fact that the composites above described are evidently *not* direct from nature, seems to remove this stiffness, or to prevent it from spoiling the effect.

ENGRAVED BY GILL ENGRAVING CO.

PORTRAIT STUDY

BY LANDY

AN UNUSUAL EXPERIENCE.

By C. E. Vredenburgh, Elizabethtown, N. Y.

I DO not know whether the subject of freshets can be properly considered a branch of photography, such as to entitle a description of one to a place in this Annual. That is for the Editor to decide. As, however, the most interesting negatives I have taken since last year's issue have been views of a calamity of this kind, which visited us last summer, it assumes an importance to me which possibly the world in general may not feel. In August last we had an experience which gave a realizing sense of what the great floods at Johnstown and in the Massachusetts valleys must have been. Ours was vastly less serious, but we were not disposed to be critical on that account.

Photo by C. E. Vredenburgh.

HOUSE ON STREAM, NEAR THE VILLAGE.

The valley of the Boquet, in which the village is situated, is, as a rule, protected against disasters of this sort by the short and steep watershed of the river and its tributaries. The valley is the bed of an old glacier, the land rising rapidly on both sides of the present river. Following up the course of the stream, there is a steady ascent for seven miles to a point locally known as the "Divide," at a height of about 1,500 feet. Thence the ground descends to the much more extensive valley of the Au Sable. The short distance and quick fall of the stream enable it to carry off easily any rainfall, even if exceptionally heavy, without doing any damage. But upon the occasion in question, a dangerous complication was introduced. On the 24th of August there was an unusually heavy rain all day, which raised the river and its principal branch to a height sufficient to attract general attention. It subsided toward evening, however, and no harm was done. But something had taken place which, if it had been known, would have caused no small amount of uneasiness. About two miles up the main branch there had been a landslide. An enormous mass of earth, trees, etc., had come down the mountain

Photo by C. E. Vredenburgh.

STREET THROUGH WHICH MAIN BODY OF WATER PASSED.

side, blocking the stream, and making a lake of considerable extent, in depth estimated to have been not less than sixty feet. This volume of water, thus held in check, remained until the 29th, when there occurred another heavy rain. Then the dam gave way, and the entire body of water rushed down the valley. Whatever got in its way had to go. The branch stream rose at the rate of an inch every five minutes, until from an ordinary mountain brook it became a torrent over ten feet deep, with about the speed of the Niagara Rapids. Some idea of the force of the water may be obtained from illustration 1. This house is extremely heavy, being built of logs, covered with clapboards. It could not have been moved from its foundation by the mere depth of water by which it was surrounded. The resistless current, however, was too much for it. Every object in the interior was swept away, carrying the window frames along. The neat garden about the house was left in the condition shown in the picture. In many places stones as large as cocoa-nuts, which had been brought a long distance, were left piled in heaps, and a quantity of sand, sufficient to replace the missing beach at Coney Island, was distributed wherever it could do most harm. At one of the largest houses in the village, which was for over an hour completely surrounded by water, the amount of sand left in the cellar was so large that several men were employed for nearly a week in removing it. Every wooden bridge in this and the adjoining town was carried away, the iron ones escaping only because they were placed on higher abutments. The public loss was over $10,000, and many private individuals also suffered severely.

The views here given were made the day after the flood. The village at this time presented rather a wrecked appearance, but work was at once begun upon the highways, and in a few weeks things were in shape again, though along the course of the stream the effects of the freshet will be plainly visible for years to come. As an experience it was interesting and peculiar, and from a photographic point of view a novelty. Once is enough, however, and no one here would wish to see a repetition, even for the sake of Art, which demands so many sacrifices from her votaries.

A WORD ABOUT THE SWING-BACK.

By F. Dundas Todd, Chicago, Ill.

THERE is, I should suppose, not a single annual issued but what contains very recondite articles about the swing-back and its use, not to speak of its abuse. My own rule of late years has been to never use it, if it can possibly be avoided, and it is really surprising how seldom one *must* use it. I got a valuable lesson on the subject from the art editor of one of our best magazines, himself, I believe, the son of a photographer and a practical man in the art. I had to take for him some life-size figures, that were painted on the wall of the Agricultural Building at the World's Fair. They were a good distance from the ground, and the best I could do was to stand my camera—an 11 x 14—in an ordinary wagon. Even then I was not high enough, and so I tilted the camera as far as the swing of the back would permit. I got a good technical negative, but on handing over the print to the customer, he exclaimed: "You did swing the back, and no mistake; but I suppose you could not help it." I asked how he knew, and he drew my attention to the fact that the figure was drawn out in the lower part of the body and contracted in the upper half. It was an object lesson, and since then I have tried to avoid using the swing-back.

I see its effect very frequently in portrait work. Generally its effect is to considerably enlarge the head and to reduce the size of the lower extremities.

In conclusion, I would strongly urge every camera to be fitted with a bubble level, that the instrument be leveled every time no matter the subject, and that the camera be not tilted and the swing-back used unless it be absolutely unavoidable.

THE HANDY AMATEUR.

By Harold Serrell, New York City.

THE art science of photography, formerly limited in scope, and embracing among its devotees almost exclusively the professional, has, during latter years, and with the growing tendency to culture and recreation, appealed to the educated masses, and it is fair to presume that the amateurs—they who have taken up photography for culture, accomplishment and recreation—are to-day numbered by the tens of thousands, scattered all over the enlightened parts of this mundane sphere. There are many of these amateurs who simply "press the button" and let some other person "do the rest," and for this class the present article will doubtless have no attractions.

There are some amateurs who almost need assistance to spend their incomes, and who can purchase anything their heart may desire or their eyes light upon, and this class will probably not be interested in this article.

There are others who could hardly drive a nail in straight even if some jack-of-all-trades gave it the start, and for this class this article was certainly not written.

There are others in this large group of amateurs—and I believe they are in the great majority—who are more or less handy amateurs and who are willing to become more so; who are also desirous of learning what they can do to help themselves, and who are eager and willing to possess themselves of all the points possible.

This latter class generally possess the requisite stock of patience, perseverance, ambition and tact, but never sufficient of "the needful" to more than begin to gratify the intense and ever growing longing for greater and higher attainments in the fascinating art science of photography.

For this class this article has been penned, in the hope that some may be helped in their efforts to gather around them a coterie of approved apparatus and accessories with which a high class of work can be undertaken with a reasonable assurance of success.

After much inquiry and observation, and many conversations with amateurs, the writer has come to the conclusion that the mishaps and failures attending the efforts of the majority of those who essay to traverse the paths of amateur photography is chargeable—first, to an insufficient knowledge of the fundamental requirements requisite to success, both from chemical and mechanical standpoints; and second, to inefficient apparatus.

Regarding the first point, I would remark that proficiency can only be attained as a superstructure upon a substantial foundation of knowledge, often attained only by weeks and months of careful study, inquiry and comparison. In regard to the second point, successful work can only be accomplished by the use of complete and efficient apparatus. The best of work can only be accomplished with the best of tools, notwithstanding the claim that some have made, that fine work can be done with window glass or spectacle glasses and a pine box blackened inside.

Fine apparatus can frequently be found second-hand, and at half the price of the same new, and it behooves the handy amateur always to get as much as possible for his money, and at the same time to make his brains and his hands represent to him in their efforts just so much money.

On the score of the lenses the writer has three of different size, aperture, angle of view and focus, which three have always been equal to the tasks imposed upon them in both time and instantaneous work in taking portraits, figures, groups and views, both of landscapes and buildings, as well as in copying; and the claims that only one lens can be used for one kind of work, and that each class of work must have its particular lens, the writer has never known to be substantiated, although it may be good for trade.

On the score of cameras there exists almost as many kinds and styles as there are peculiarities in the human make-up; but the handy amateur will study and cull out the advantageous and best points according to his fancy and conditions, and with a good lens and some good plate holders will make himself a box that can hardly be told from the best in the market, and at one-quarter of the cost, the value of the time being offset by the pleasure and satisfaction of working with one's own production and handiwork.

For camera making at home a good working drawing should first be made and the camera built from that.

Amateurs are often discouraged and disheartened by the poor work done by others for them, and the old adage is as true to-day as ever: "If you want anything well done, do it yourself," for surely no one will take the interest (even for pay) in our work that we should take ourselves.

A very handy thing for the amateur is a portfolio of useful receipts, culled from journals, and appropriated by permission from the brains of some more successful amateur friend. Such a portfolio can be readily made by folding sheets of fine manilla paper to the desired size, and cutting the edges with a knife and straight-edge to make leaves. Then take two pieces of cardboard of equal size, and cut three-quarter inch strips off of similar edges and reconnect them by muslin strips glued on to form hinges. Make holes at intervals in the strips and leaves to thread a tape through to bind them together, and then surface the cardboard with ornamental paper if desired, to complete the portfolio.

In the matter of dark rooms no amateur should deceive himself that he can do good work without a dark room, and the dark room like a home, "be it ever so humble," must come sooner or later.

The handy amateur can make his own dark room with tongued and grooved sideboards. The ceiling and floor can be those of an ordinary room, or if the dark room is built in a dry cellar with cement floor, a ceiling can be faced on the beams and a floor built over the cement. The dark room should be ventilated either by metal elbow pipes, blackened inside and outside, let through the board sides, or by opposing slabs of wood over openings in the board sides, the slabs and sides being blackened on their opposing faces. The light of a lamp or gas jet is best outside, and its heat under a metal pipe opening into the dark room can be utilized to draw the air in an ascending current out of the dark room, while fresh air enters by perforations or pipes in the opposite side. The light should pass into the dark room modified and regulated by ruby glass and adjustable sheets of colored papers or fabrics.

Shelves for plates, chemicals, etc., a small iron sink with short pipe and pail, will assist in completing the appointments. A metal tank holding about a pail of water, and from the bottom of which a pipe extends down and terminates in a faucet at the sink, is a great convenience. This tank can be secured upon the board sides of the room, either in the dark room or outside; but if outside, the hole through which the pipe passes must be made light-tight.

If you break the flanged base of a graduate, do not throw it away, but break off the remaining pieces, so that none remains to do any injury, and make a hole in a piece of thin board that will let in half the length of the graduate, then form a shelf of the thin piece of board and fasten it up in the dark room, and your graduate, supported by this shelf, remains almost as useful as ever.

The chemistry of photography, as exemplified by developers, fixing baths, toning solutions, etc., claims the careful attention of the amateur. Many, probably the great majority of amateurs, purchase ready-mixed chemical solutions for their work, and it is almost synonymous with indifferent success or failure, to learn that an amateur purchases his solutions ready-mixed. The handy amateur will purchase the best of chemicals and learn to mix his own solutions, and having, by dint of study, perseverance, assistance and practice, learned to handle his chemicals, he will be able to do superior work, which will be but the natural outgrowth of a knowledge of his plates, their exposure, and the adaptation of the chemicals to suit the case; a condition which is not possible with the manipulation of ready-mixed solutions, whose composition can usually only be guessed at. The writer also doubts the possibility of attaining the same degree of success in work that the amateur farms out, as if personally and intelligently accomplished.

Those handy kits we employ in large holders for plates of smaller size, can be readily made by the handy amateur out of a cardboard that can be purchased. This is black on one side and white on the other, and of a thickness about equal to a glass plate. This cardboard comes in large sheets, and can be cut with a knife or metal shears to the required size. The openings therein for the desired size of plates can then be made, and small corner-pieces of thin card glued on to retain the plates in place, and a disk can be secured to each kit by an eyelet, to provide for inserting and removing the plate. The writer has quite recently made one dozen such kits at a cost of twenty-five cents. In the matter of printing frames, our manufacturers always make a projecting edge to receive the negative. This costs a quarter of an inch of picture all around. Why not have our printing frames so as to print the full size of the plate they are made to hold? The handy amateur can accomplish this by cutting away this edge, and cutting into the face of the frame all around the inner edge a quarter inch rabbet. A piece of clear and perfect plate-glass is now secured in the frame fitting the rabbet, and a strip of moulding is secured to the frame over the edge of the glass to hold it in place. The writer has all his frames fixed this way, and one of the many advantages obtained is an even bearing upon the negative, as it lays upon the glass face, and one never breaks a negative in this printing frame.

Portraiture is one of the most fascinating and charming departments of amateur photography. Many are deterred from attempting it without a skylight, but a skylight is not indispensable. Many fine pictures may be taken by window light, and especially outdoors; and when taken out of doors the shady side of a house, under a tree, whose lowest branches are not less than fifteen feet from the ground, makes the most desirable location, and affords a top light without the glare that affects the eyes of the subject. A wooden platform to set upon the grass or earth makes a level base upon which to spread a drugget or rugs, and set furniture and accessories, and also a support for a background.

There are many choice and desirable backgrounds that may be purchased which give graduated and artistic effects, but shade fabrics of light tints make very desirable even-toned backgrounds. The handy amateur can make a very desirable stretcher or frame for his backgrounds by taking two round poles, about seven feet long, and nailing thereto the two side edges of the background. Cross top and bottom poles, with holes in their ends, are placed between the long poles, and wooden pegs are passed through holes in the long poles into the holes in the ends of the cross poles. The lower ends of the long poles have short spikes and the top ends have rings. The spikes keep the bottom of the background steady, and heavy cords are passed through the rings from fixed points, so as to hold the background rigidly in place. The top cross pole can serve as a roller for a fabric that can be draped to either size as a curtain. This is what may be termed a knock-down background, as it can be taken to pieces and rolled and packed up in a small compass between times of use.

The handy amateur who indulges in portraiture will learn to retouch his own negatives; not only as a matter of economy and satisfaction, but because, as now universally practiced, portraiture retouching is done to death, and lines and gradations that impart

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STUDY

BY HEMPERLEY

expression and evince charact[illegible]r are eradicated, to give place to the representation of faces as if m[illegible]de from putty.

In indoor portraiture by window-light, the use of a tripod with the camera is somewhat risky, as in moving around the camera one is liable to strike a tripod leg and bring about a wreck. A small table, with a wooden top in which a hole can be made for the tripod top screw, which will be used to hold the camera to the table top, is a very convenient arrangement to employ, and if the table have a telescope standard of metal, as is found in many old-fashioned tables, so much the better, as then the height of the instrument can be varied at will.

Indoor portraiture by window light is very liable to produce great unevenness in lighting the face, but the handy amateur can overcome this by making a reflector of two light frames of wood covered with white muslin. These frames are to be hinged together horizontally, and have cross supporting feet to rest on the floor and pivoted stay strips upon the back to keep the frames in the same plane when opened. In its folded condition this reflector will occupy but little room against a side wall, and in use can be placed in any desired position to light the off side of the sitter's face, so as to counterbalance the light of the window. The background hereinbefore described can be used indoors with the same effect as out of doors, and when combined with the above named reflector will give excellent results.

To those amateurs who are fortunate enough to be wheelmen, a deal of pleasure can be derived from carrying the camera in jaunts awheel, and preserving by our photographic art the lovely bits of nature frequently seen.

The most convenient device the writer knows of, and one which he partiall[illegible] consists of a clip secured to the saddle-post and similar to t[illegible]ised with a child's seat. Two steel rods adjustably secured [illegible]s clip extend forward toward the handle bars and bend over up[illegible]dly in a semicircle, and branch out into a platform of rectangular [illegible]ape to which are connected two straps for holding the camera as it rests upon the platform. This platform and rods are all in one piece, and the camera carries between the rider and the handle bars steady and without vibration. It is a mistake to attempt to carry a camera upon a carrier secured to the handle bars, as it interferes with the steering and steadiness of the wheel, and here also a maximum of vibration is encountered.

Lantern slide making is quite sure sooner or later to engage the attention of the amateur. Slides by contact are easily made, and most amateurs are acquainted with the operations without any further suggestions. Slides by reduction require careful manipulation, and most important in connection therewith is the apparatus for making the reduction from the negative to the small slide. The handy amateur can readily make himself an apparatus which, in connection with his regular camera and tripod, will accomplish the best of results.

A true board about three-quarters of an inch thick is needed, of a length to be determined according to the focus of the lens employed, and the size of the largest plates from which reduction is to be made to the area of the slide, and of a width slightly greater than the longest dimensions of the plate. Three pieces of about the same width as this board and about half the length are nailed together and to one end of the board, so that one end of the board has the appearance of an open-ended box. At the outer end of the box, and to the under side of the board, are nailed two cross-strips of wood separated by a space equal to the width of two window sashes. This end is to rest upon and straddle the window sashes when the top sash is down. A wide strip is secured to the under side and other end of the board. This rests upon a tripod and the tripod screw should enter a hole centrally in this strip.

A slide way for the camera is made upon the free end of the board adjacent to the tripod, and the far end of the board at the end of the box part should be made with slide-ways for a frame to hold the negative.

The inside of the box part and face of the slide frame should be blackened, and the center of the negative opening in the slide frame should agree in measurement from the board with the center of the ground-glass of the camera on its slide-way. This can be readily accomplished if the device is carefully made.

This reduction device, of course, points out of a window to sky light, and ground-glass can be used or not in the negative frame at the pleasure of the operator. The focus cloth is to be thrown over the camera and end of the box part, thus forming a dark chamber, and a piece of paper, with a central opening agreeing in size with the visible area of the lantern slide, can advantageously be pasted to the ground-glass of the camera in register with the kits of the plate holders holding the lantern plates.

The writer has found such a device exceedingly useful.

The "good of the order" is a keynote to progress in any association of kindred spirits, and should likewise maintain among amateur photographers, and if the writer succeeds in benefiting any fellow amateur by the suggestions contained herein, he will feel amply repaid for this effort.

PROGRESS OF THE APPLICATION OF PHOTOGRAPHY TO THE ART OF SURVEYING.

By Colonel A. Laussedat, Paris, France.

THE metrophotographic method, to which we alluded in the Annual of 1893, when giving an account of the conference held at the Conservatoire National des Arts et Métiers, in the winter of 1891-92, has recently greatly spread in America, as well as in several of the large countries of Europe. It is perhaps well to premise by stating that in America, as in Canada, since the year 1888, this accurate, and at the same time expeditious, method has been used with the greatest success over enormous tracts of land—the Rocky Mountains and the whole length of the Canadian Pacific Railway.

After a previous triangulation, made with the utmost care by Mr. Drewry, a single corps, consisting of that very able photo-topographer, Mr. McArthur, an assistant surveyor, a foreman and a muleteer, has been able to accomplish yearly for the construction of a map with a scale of one twenty-thousandth, reduced to one forty-thousandth for printing, the average speed of five hundred square miles, an amount that could not have been approached by any other method. If we remember, too, that the country traversed is practically uninhabitable for three or four months of the year, and that snow-storms, rains and forest fires are no little hindrance, and that in spite of all these obstacles the expense does not exceed seven and a-half francs per mile, it will be conceded that this is a very simple solution of the problem, and one which without the aid of photography would have been impossible.

These remarkable results are certainly due to the ability of the operators, but the credit for the work belongs in great measure to the Surveyor-general of Canada, Mr. E. Deville, the author of an excellent work entitled "Photographic Surveying," published in Ottawa, in 1889.

Last year this method was used for the mapping of the frontier of Alaska, and of British Colombia, and the engineers of the Coast and Geodetic survey of the United States, headed by their learned director, Mr. Mendenhall, became very much interested therein. They even seemed disposed to adopt it for their own work. We believe that some photographic work, the raising and leveling by horizontal curves, is now in progress in Colorado and Utah, this rapid method being employed, the object being to facilitate the work of irrigation and drainage, of no little importance to agriculturists. We may add that the Mexican engineers, one of whom, Mr. Tomas Tragoso, addressed us directly for precise information regarding this method, are experimenting with it, especially in Sonora. We have also learned that in the past seven or eight years a German naturalized Brazilian, Baron de Capenema, had ordered from Berlin several of Dr. Meydenbauer's photo-theodolites, with a view to determine the boundaries of Brazil and the Argentine Republic. Whether he has accomplished his desire or not, we do not know. Before leaving America, we must not forget to mention the proposition made to the Chicago Congress by Mr. W. Jerome Harrison, of Birmingham, England, that an international collection of photographs should be made, and exchanges between different countries encouraged. The object of this proposition will, evidently, not be attained until a convention is held to establish a method of procedure. In certain countries, Germany for example, the views of mountains are taken for the express purpose of correcting plans, in others the views of picturesque landscapes are utilized in making new maps. There is reason, therefore, to believe that if a general understanding is reached the metrophotographic method will come to the front. However, in addition to the organization, by Dr. Meydenbauer, of the Berlin Institute, for the preservation and restoration of the plans of these mountains, and a few trials made by German officers and travelers, among whom may be mentioned Mr. Jordan and Dr. Stolze, we must allude to the remarkable work done since 1878, in Europe, by Paganini Pio, engineer of the Italian geographical military institute, for the construction of a map of the most broken part of the Alps, made to a scale of one-fifty thousandth; the examinations of lands for railroad projects in mountainous districts in Styria and in Austro-Hungary, where all the railroad engineers, forestry engineers, administrators of large cities, officers of all classes, professors, etc., interest themselves in the method. We should add that in the latter country, as in Germany and Italy, a large number of books have been published on this subject, and that the instrument makers have vied with each other in the making of apparatus suited to the requirements of the practice.*

France has greatly busied itself in developing an invention, the principle of which, due to the celebrated hydrographic engineer, Beautemps-Beaupre, dates back a century, that is, long before the discovery of photography, and which has been developed by

* Mr. Pollack, railroad engineer in chief, and Professor Steiner, of Prague, are both authors of important works and are zealous propagators of the method in their country.

us during forty years in the official publications. Personally, we have recorded these works, and those that have been ably executed by our collaborators, and chiefly by Commander Javary, from 1850 to 1871, a period in which we have each one been called away from these studies by other duties.

In the conferences recently held at the Paris Museum of Natural History, we demonstrated to a large audience, composed principally of explorers, this method as applicable to very rapid work and had the satisfaction of afterward receiving several of the audience, both French and strangers, who asked for details, which we were happy to give.*

We have also had numerous inquiries by letter and by visitors, among whom may be named Mons. Vallot, director of the Mont Blanc Observatory. The list of these correspondents would be too long to give here; we will confine ourselves to indicating the countries where photography is being adopted, or is to be adopted in surveying. These include France, Greece, Roumania, Belgium, Norway, Portugal and Mexico. We know that trials have been made in Switzerland, and that in England many persons, principally among the military, have seriously busied themselves with it. It can therefore be considered very probable that this movement, now manifesting itself in so many parts of the world, will ultimately be generally adopted, and that the opposition it has at first encountered will disappear entirely.

PHOTOGRAPHY AT CORNELL UNIVERSITY.

By E. B. Crosby, Lockport, N. Y.

CORNELL UNIVERSITY believes that photography should play an important part in the education of its nearly two thousand students. To that end it has spared nothing that would tend to enlighten the students selecting that branch of study. As a result, this particular course has come to be one of the most popular in the University, and since its incipiency, in 1876, it has had a very healthy growth. During the last five years the number of students electing this work has averaged between eighty and one hundred, and this year finds the number at high water mark. Of the number, about thirty young ladies are included. They prove to be good students, too, and some of the best negatives are credited to them.

To the stranger visiting Cornell on a pleasant day, it would be

* Of the French, one leaves soon for Tonquin and another for the Kerguelen Islands, to make an extensive survey by the aid of photography.

quite unnecessary to tell him that one of its features is a course in photography. He would no sooner have entered the campus, when groups of cameras here and there, with as many attendant students, and all busy photographing some object, would have told the story. The sight is a novel one to be sure, when there is an unusually large number out on "the field" at the same time. This outdoor practice is not confined to the campus alone, but the students are permitted to ramble anywhere in search of suitable views. In this connection it should be noted that nature has done a great deal in picture making for Cornell. The college buildings are located on a hill some two hundred feet high, and bathing its feet in Cayuga lake. In the valley the city of Ithaca dots the scene, while a few miles to the west another hill rises and intercepts the view of the sun late in the afternoon, causing some charming sunsets. These, together with many adjacent gorges and waterfalls, make an ideal place for the professional as well as the amateur photographer.

Well, we will suppose the class has been "blinking" away at some of the above objects and plates are all exposed. The procession now is followed to the indoor work. A large three-story red-sandstone building is entered and found to be the home of those taking the course in photography.

The dark rooms are located on the upper floor, and are eight in number. They are provided with all of the latest improvements, including gas and daylight for developing. The laboratories, print rooms, wash rooms, etc., are also located on the same floor. Scattered throughout the building is the different apparatus used directly or indirectly in this branch.

The building contains, in addition to the amply-equipped laboratories of the department, a lecture-room, seating about two hundred students, and four recitation rooms for the use of classes. Piers are provided in several of the rooms for apparatus requiring immovable support, and some of the rooms in the basement and in the annex have solid floors of cement. Arrangements for experimental work are most complete. Gas, water, steam, oxygen, hydrogen, compressed air, blast, and vacuum cocks are within easy reach, and dynamo and battery currents are available. A masonry pier, four by twelve feet, permits the use in the lecture-room of apparatus that could otherwise only be used in the laboratory. A small turbine on the lecture-table furnishes power for a variety of experiments. Lanterns with the lime or electric light are always in readiness for use, when they can in any way aid a demonstration. Adjacent to the lecture-room are three large apparatus rooms. On the first floor are several laboratory rooms, equipped with reference to various special lines of work, among which may be mentioned one for electric light photometry.

One lecture is given each week by George S. Moler, assistant professor of physics. Mr. Moler is an experienced photographer and has one instructor and an assistant to help him. The students are required to take notes on the lectures, and hand them in at the end of the term. The ability of each is obtained from an examination of these books. In addition, the pupil is required to spend seven afternoons at least in the laboratory during the term. His first work is making lantern slides, and afterward regular negatives and finished prints. He is also required to provide himself with the following equipment:

1 doz. Lantern Slide Plates, 3¼ x 4 in., thin crystal glass.
1 doz. 4 x 5 in. Dry Plates.
½ doz. 5 x 8 in. Dry Plates.
1 fluid oz. of Chloride of Gold Solution.
1½ oz. Sulphite of Soda.
$\frac{1}{10}$ oz. Pyrogallic Acid.
1 doz. 4 x 5 in. Maroon Gilt Beveled-edge Cards.
½ doz. 5 x 8 in. " " " "
1 doz. 4 x 5 in. Sensitised Paper.
½ doz. 5 x 8 in. " "

The university furnishes everything else necessary for the proper consumption of the above material. A laboratory fee of one dollar is charged for incidental expenses.

In the next building photography also has a place. It is here that the University photographer has his rooms. He devotes his entire time to the work, as he is expected to furnish prints of anything the different professors may desire. A large part of his work consists in making lantern slides and prints of apparatus. He prepares his own lantern slide plates. Thus we have somewhat of an idea of picture-making at Cornell.

COMMENTS.

By Alice Lee Snelling-Moqué, Washington, D. C.

It is never too late to learn, and the wise ones say we learn most by our failures. But photographically we are often inclined to class as failures what may be deemed excellent by others, who are considered competent to judge.

One of the most peculiar features of the late exhibit at the Cosmos Club, given by the amateurs of Washington, was a fact in relation to the selection of the prize pictures. The judges, all gentlemen of taste in matters photographic, were selected by the committee with every confidence in their ability, and yet the fact remains, in several instances the pictures obtaining the certificates of merit were the least meritorious of the entire number of the exhibitor.

"I had my platinotypes all ready," said one exhibitor, "and found I needed just one more print to break the regularity of the number. I searched about and found one old measly picture, pretty poor in pose, bad in lighting, and worse in printing. I hesitated some time, fearing it would spoil my exhibit to include it, but at last decided to let it go. That picture," he added, with a pathetic sigh, "the judge selected as my best, and gave it the award of merit."

This disgusted prize-winner was not the only one who felt the selections of the judges were, to say the least, somewhat of a surprise. While it is undoubtedly true that the proper exhibits received honors, still it is as true that the pictures selected as the best were not generally accepted as such, by the winners themselves or the public generally.

The lesson to be learned is plain. We are too apt to underrate our own efforts, and in striving after a high ideal become hypercritical. The result of our work seems to fall so far below the ideal we had in mind that we class as a positive failure what the more calm and unbiased dispassionate judgment of others can find good points in, which we, in our hasty condemnation, have failed to note. It is not my purpose to advise all amateurs to send in to exhibits their worst work, in the hope that a like good fortune awaits them, for our own judgment is worth more than any number of awards, and it is only fair to ourselves to know that in the natural order of things no one will be apt to underrate his own work. Know by all means your good work and make a study of the poor. Here is where photographic growth must begin. It is all very well to be shown a fine negative made by an inexperienced worker, but it is "luck," not photography. The good fortune that sometimes gives bunglers surprisingly good results is only a happy chance, and is worth no more than the novice at whist, who takes a prize without knowing a lead. The idea every one of us should hold up as a beacon is Photography as an Art. Everything that has been done, every step in advance, has been the work of the progressive amateur worker. Studio methods run in a rut, and we must thank the much-abused amateur portraiture for having already done away with many of the infernal machines used formerly in posing under the skylight. Instantaneous photography proves we need not be made stiff and uncomfort-

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able to "Look Pleasant," and the professionals themselves are glad to profit by the delightful achievements in instantaneous portraiture of children, first inaugurated and made a success of by the amateur worker.

Then all praise to the band of amateurs whose aim is to elevate photography into picture-making, instead of picture-taking! Much has been done, but much remains to do. Let the good work go on.

THE CAMERA IN THE FIELD.

BY WM. D. FARRINGTON, BROOKLYN.

WITH the growth of amateur photography, the art of taking pictures has ceased to be a fad and has become a common household accomplishment. In many cases it has reached the dig-

Photo by W. D. Farrington.

PUEBLO OF WOLFRI.—MOQUI PUEBLOS, ARIZONA.

nity of an art. Wherever the glamor of picture making by sunlight has once taken hold there is a constant progress in scientific and artistic work. The snap-shot enthusiast, whose fearful and wonderful efforts were the delight of the paragrapher of five years ago, is succeeded by a painstaking individual who never takes a poor picture—at least he never exhibits one.

A result of this improvement, which has been no small assistant toward it, is the camera club exhibition, which has become a regular part of the work of amateurs wherever any number of them foregather in one place. Each year the exhibition has been more artistic and resembled more closely a true picture gallery, until it is extremely difficult to tell whether the amateur or professional is the leader in the advance of photography.

The great differences between the two classes is that the professional shows results, while the amateur explains his method. The superbly appointed dark room of the New York Camera Club, or the advantages offered by the clubs of photographers in any large city, are equally objects of interest to visitors with the prints which line the walls of the exhibition room. In reality, from the standpoint of accessories and opportunities, the amateur photographer of a large city is far in advance of his professional brethren, and is in reality little less than a professional himself, in that he depends upon perfect mechanical conditions to produce a good picture.

In writing a description of the last exhibition in New York for one of the daily papers, I made a plea for the introduction of a new class of photographs, which should be called specimens of field work. It is practically impossible that the operator, who is dependent on backwoods accommodations, should rival the city man in the finish of his work.

As a text for my plea, I have before me a small print, which would never find a place among the exhibits of the least ambitious display. The circumstances under which it was taken preclude that.

The picture represents one of the famous "Seven Cities of Cibola," that caused such a stir in Mexico during the middle of the sixteenth century. The story of the famous walk of Cobeza de Vacca, from the mouth of the Mississippi to the inhabited portions of Mexico, long before the first Englishman had planted his colony on the American continent, is too long to tell. At any rate, he reported that in the far north, in the present territories of New Mexico and Arizona, there were certain rich cities, which popular acclamation at once named the "Seven Cities of Cibola." Two or three individuals started out to capture the great treasure supposed to be stored in these strange, rock-built towns, but all were unsuccessful until that of Don Franciso Vaques de Coronado, who conquered the country in 1540.

To the disappointment of the conquerors, the famous cities were found to be no more than communities of village Indians, so at one blow the last hope of discovering another treasure house, equal to Mexico or Peru, was swept away. But archæologically the ruins of the "seven cities" are worth more to-day than the wealth captured by Cortez. They offer the only existing example of aboriginal American life and polity.

My picture represents one of the Moqui Pueblos. These were all situated on a high rock island, in the midst of the almost interminable plain. It is a natural fortification, and can be approached only by climbing a long, narrow serpentine path in the crevices of the rocks. One evidence of the age of the present Moqui villages, is that the paths between them have been worn into the solid rock to the depth of several inches, by the soft moccasins of countless generations.

The people are rapidly dwindling away and will probably soon be extinct, which is a great pity, as they belong to the very small class of "good Indians."

But to return to the photograph, which represents one of the deserted villages. No railroad has a station at Moqui, and to get there means a long ride, under a burning sun, over the awful Arizona plain This alone, coupled with the want of water, is a hardship, but when you take a camera with you, it becomes purgatory. I believe everything can be packed safely on a horse but a camera.

To take a picture in that glaring light, and afterward develop it in a tent at night when the thermometer was making a brave effort to burst the top of the tube, was a triumph of art over nature. If I remember rightly, some of the plates would frill when the perspiration dropped on them. The dark room outfit consisted of a ruby lantern, so arranged that it would hold a candle and the various necessary chemicals, put up in dry form and dissolved in water brought from the single spring which was the sole supply of the prehistoric inhabitant of Tusayan. Yet the large plate was passably good, and has since been used for illustrative purposes. The smaller was made from it.

All this by way of illustration. As a newspaper correspondent the camera has been invaluable to me personally. It supplies the lack of artistic skill in draughtsmanship, which can be supplied in no other way. From this I argue that the hand camera should prove a valuable adjunct to the traveling outfit of every amateur photographer, even if the pictures produced lack something of the delicate beauty and high finish of the mechanical photograph produced under the most favorable circumstances. It is true enough that a good view of a cow is better than a poor landscape under the usual circumstances; but if the landscape contains extraordinary objects of interest the picture will be valuable, even though it fall below the standard.

Men are traveling through the six continents with cameras, and their pictures should be of value. The very difficulty fo the subject and its conditions may be responsible for a poor plate, while at the same time they enhance the interest of the picture. The most interesting collection of views which has been shown in New York for many a day, was the series taken by Lieut. Peary on his famous expedition to North Greenland. The pictures were but moderately good as photographs, yet every one, photographers included, wanted to see them.

Therefore, why should not the camera clubs introduce a new class in their exhibitions. A class wherein the various out-of-the-way pictures should be shown in their best light, and not overshadowed by more beautiful if not more interesting prints?

An exhibition of this kind should be productive of a large amount of material gathered in all parts of the world. And not the least of this would be the forest and wilderness views of our own country. With the improvement of the hand camera this is easy to procure, and there is no adequate reason why the less known portions of our land should not be photographically mapped, as well as the most beautiful corner of Central Park.

A NEW METHOD FOR THE TREATMENT OF OVER-EXPOSED PLATES.

By Fred H. Davies, Birmingham, England.

IT is well known to most photographic workers, that, in negative work, hydroquinone has an unhappy tendency to give harsh contrasts, whilst after a very full exposure, pyro. and soda not infrequently yields a very thin negative, incapable (unless subsequently intensified) of giving a brilliant print.

Some little time ago the thought occurred to me that, by utilizing the two above-named developers, the unpleasant harshness of the one might be mitigated by the other and *vice versa*, and in special cases a more pleasing and satisfactory result might be gained than by the use of one alone.

I therefore made a series of experiments in this direction, and eventually came to the conclusion that whilst the alternate use of the two developers would give a new power to the operator, hydroquinone used after pyro. was especially useful in giving strength and brilliancy to over-exposed plates. The pyro. and soda formula which I used was one of the many familiar ones, but the hydroquinone developer was composed as follows:

(A formula that, by the way, I have found most useful for slide work.)

I.

Hydroquinone	180 grains.
Sodium Sulphite	4 ozs.
Potassium Bromide	30 grains.
Boiled or Distilled Water to	38 ozs.

II.

Sodium Hydrate	180 grains.
Boiled or Distilled Water to	38 ozs.

III.

10 per cent. solution of Potassium Bromide. A few drops of this is to be used only in cases of gross over-exposure.

For use, equal parts of Nos. 1 and 2 should be diluted with a similar quantity of water.

I presume it is unnecessary to say here that all cases of suspected over-exposure should be treated with a weak and much restrained pyro. solution.

When it is found that the plate has been over-exposed, check development, well rinse the plate, and pour on the hydroquinone. It will be found that the plate will gradually gain in density, and will, moreover, be free from the painful harshness that characterizes negatives developed with hydroquinone alone. It is obvious that for snow pictures this method will be found to possess many advantages, for most photographers have experienced the difficulty of obtaining density in snow scenes without the sacrifice of the half tones. To those also, who in the holiday season expose a number of plates in a district where they have not previously worked, and where it is inconvenient or impossible to develop their plates as they proceed, I venture to think the above method may be found of some little assistance.

HAND CAMERAS TO THE FRONT.

By William J. Spurrier, Moseley, England.

THEY are coming! they are going! Certainly the Hand Camera is coming to perfection, and going to the front. All the newest patterns of "Field" cameras are more or less improved, upon lines proved to be advantageous by the once despised "Hand Camera." Then again, Hand Cameras are made more and more like field cameras, until it becomes difficult to distinguish between the instruments at all. Thus—all things point to the fact that the Hand Camera has come to stay, and yet it does not get full acknowledgment for all the work done with it.

Even with the box form of Automatic Hand Camera, a much wider range of work can be done than is conceivable at first. It is with this form that I have had to be contented to continue my experiments, for I have not yet been able to complete my larger camera hinted at in last year's ANNUAL, and of which I hope to give some account in the next, if the Editor extends his invitation for it. But the quarter plate satisfies me for the present, size does not trouble me much, especially as we have the power, by the aid of Cresco-Fylma, of making our quarter plates into beautiful half-plate transparencies or opals. This is a truly wonderful and most useful power, for instead of carrying the extra weight of a whole plate apparatus, a half plate size is all that is required to give the larger sized result, and to my mind one is even better off with the quarter size.

The mention of half plate reminds me of a case which almost puts the proverbial fisherman or sportsman into the shade; I refer to the well known method of making up for a *bad* day's sport. It was at a regatta, there were four of us with cameras, mine was the only Hand, and there was only one-half at work. It was that *half* man, he left the pier about half time, and just in time to secure some shots of that regatta; for he had not been gone long before a professional appeared upon the scene. The last was not the least, for he was the only one who got a decent negative, the poor *half* man, had got his yachts all across the plates and so made up for his defects in the way indicated. I wanted to send my camera away, so got another professional to develop the plates for me, and he went and spoiled the lot. They were very *queer* instantaneous plates I found afterward, and to my cost I discovered, in different parts of the coast, when it was too late, that the knights of the dark room are not used to working such ticklish things. They are blessed with such good light, that they only use "ordinary" plates, so I do the same mostly now, but even those I take home and develop myself.

Before leaving that regatta, there is another point I would touch upon, and that is the way unsuitable lenses are used. That professional with the half plate had a lens of such short focus, that his yachts were smaller than mine on 3¼ x 3¼ plates, and my lens was only 4¾ inch focus.

Now, referring to lenses, it is generally recommended that an R. R. lens is necessary to obtain the figures in street scenes, or groups of a good size in the picture. The result is, that if, as is generally the case, the background is some distance off, everything but the figures is out of focus. And when that background is composed of trees, the result is "spotty," a state I do most object to. With the ¼ plate Hand Camera I am now using I can get figures three inches high, and the lens is only an inexpensive, single plano convex achromatic combination. The definition is excellent, and it is rapid, so for general Hand Camera work I do not see that it can be beaten, and fail to find a sufficient reason for the recommendation to use an expensive R. R., unless it is in the interest of the lens maker. But whatever class of camera the lens is fixed to, it must be well and thoroughly made.

I am well aware that I have written nothing new; but I have dotted down some points that I have not seen put forward as prominently as I think they should be, for everybody is not an expert, and it often is that the simplest hints are the most difficult to get. If you want to make pictures, and that is the aim nowadays, there is no doubt about the difficulty of getting just what you want on the plate, so do not begrudge the requisite time for composing your picture. What is the reason in carrying a large size camera, tiring yourself out, and paying more than double the price for plates or films, when by carefully securing your picture, you can enlarge it by the means before mentioned, and you have your small negative for printing Lantern slides? Hand Cameras and Optical Lanterns are only just beginning to be known amongst a few; the great body of the people have not recognized their value, have not realized their necessity. Every home, every store, every manufactory ought to possess its Hand Camera and optical lantern, and, what is more, every member of the family should know how to use them.

ENLARGING.

By E. Forestier, Paris, France.

THE majority of our amateur photographers have discarded the tripod camera, and to-day use exclusively the hand camera. This latter, whose size, hardly two years ago, permitted the use of 9 x 12 or 13 x 18 cm. plates (current sizes in France), becomes more and more reduced in size, and in form bears no resemblance to the original article. The demand for such apparatus is so great, and the manufacturers scatter them in such profusion on the market, that to-day one cannot move in either street, country, seaside or mountains, without being approached by some one, who, with innocent air, presents the end of his cane, looks at his watch, or directs on you his field-glasses, the cane, watch or glasses being, as is well understood, but *fin de siècle* photographic apparatus cunningly concealed in one or other of these foolish disguises.

The French law forbids the use of the camera within a distance of one kilometer from the works of the War and Navy departments; how with these innocent-appearing instruments is the law to be upheld? Among us this mania for thrusting sensitized plates even in cravat pins creates great prejudice against the photographic art, for glasses, cane or watch, are capable of producing pictures of but little value; they are, in fact, playthings.

Without discussing further the inconveniences and qualities of these small instruments, as this is not the subject of which I propose to treat, I take them for what they are worth, and proceed to the consideration of the after-work of enlarging the image on this liliputian negative on gelatino-bromide paper. The small negatives obtained in these little portable cameras are sometimes extremely fine, and enlargements therefrom may give very gratifying results. The practice of this mode of recreation forces me to recognize that enlargement is not only necessary, because of the small size of the contact prints, but that such an enlargement, well made, is equal in quality to that which would have resulted had a large camera been employed; as will be seen, I do not wholly condemn the playthings mentioned, but accept them on the understanding that the images are to be enlarged.

The development of negatives which are to be reproduced in larger dimensions is a delicate operation, requiring considerable care. It is not essential that the negative shall give a perfect contact print, but a soft negative, slightly dense, the deeper blacks of moderate density, and the whites very clear. This can be obtained by using the proper developer. If pyrogallic be used the following solution may be employed:

A. Carbonate of soda, saturated solution.
B. Sulphite of soda, saturated solution, slightly acidulated with citric acid.
C. Pyrogallic acid, solid.
D. Bromide of potassium, saturated solution.

Pour into a tray enough pure water to completely cover the plate, and add ten cubic centimeters of sulphite (B) for every one hundred cubic centimeters of water used; add two or three drops of bromide (D) and finally add two mustard-spoonfuls of solid pyrogallic acid (C).* Mix well by rocking the tray and then immerse the plate. After a minute, remove the plate and add two cubic centimeters of carbonate of soda (A) to the bath. The solutions being well mixed,

* We suppose that 100 c.c. of pure water are used, and that an instantaneously exposed plate is to be developed.

again immerse the plate. If at the end of thirty seconds no traces of the image are apparent, more of solution A should be added.

As soon as the slightest trace of an image appears, do not add anything more, but continue to rock the tray until the whole picture is brought out. Force the development slightly and toward the end of the operation add another spoonful of solid pyrogallic acid, first, of course, removing the negative. This will give density to the image. Sometimes this addition of pyro is unnecessary; if the sensitive plate has been exposed to a good light, and with an excellent lens it will not be needed, for it must be remembered that we desire a soft negative. The following amidol developer gives very good results: Dissolve in a litre of pure water 35 grams of neutral anhydrous sulphite of soda; after this has entirely dissolved, add 5 grams of amidol and one cubic centimeter of a saturated solution of bromide of potassium; then filter. In this bath the negative image appears perfectly in the required condition. Whichever may be the developer employed, the fixing of the negative is done in the ordinary way in a twenty per cent. solution of hyposulphite of soda. After leaving the hypo. and before washing, the negative is plunged for a few seconds into a dilute solution of red prussiate of potash. This removes all traces of cloudiness, making the transparent parts of the negative clearer. Here then, we have, in a few words, the general rules to be followed for obtaining a negative suitable for enlarging purposes.

I am not going to describe the various systems employed for enlarging; some use daylight, others artificial sources—oil, gas or electricity. Good results may be obtained with either. Having tried them all, I write understandingly, and what I condemn and find faulty from repeated personal experiments are the diapositives adopted by some makers, by which it is impossible to know the intensity of the image projected. Under these conditions it is impossible to estimate the time of exposure, which, according to the actinic power of the light, the density of the negative, the rapidity of the lens, etc., varies between ten seconds and five or ten minutes. These enlarging cameras with invisible projected images only give most unsatisfactory results, unless by chance. It would, however, be possible to adapt to these incomplete instruments a small shutter or some other combination, allowing one to see the brightness of the enlarged image before printing on the sensitive surface, under which circumstances the time of exposure would not be a matter of guesswork.

We will suppose that we have at hand an arrangement for enlarging, by which we are able to examine the luminosity of the projected image, to change at will the focus of the lens, to establish equally at will the distance that should separate the lens from the negative, and the position that the screen, on which the image is projected, should occupy. Everything should be movable, thus having the advantage of permitting enlargements of all dimensions from any size of negative.

The image being projected of the size desired by the operator (I will say nothing regarding this operation, since it is described in every photographic text-book), all actinic light is excluded and the bromide paper put into place. If it be found necessary to use a light, a dark ruby light may be employed, but only long enough to affix the bromide paper in position, as even red light in time affects the sensitive surface. We advise that under no circumstances should the paper be covered with a sheet of glass, as recommended by certain authors. The glass may have the advantage of keeping the paper flat, but it has certain disadvantages which have led me to entirely abandon it. The slight rounding of the paper is not worth considering, and will have no influence on the final picture, because again we advise that the lens be well diaphragmed down, the increase in time of exposure not being detrimental in work of this sort.

I will not discuss the time of exposure. The novice, no matter what he may be told by the author of a treatise, will only learn by practice. It is indispensable that the image reflected on the screen be well examined, and the sensitiveness of the paper used, and the energy of the reducing agent (developer) employed, must be taken into account. The latent image on the bromide paper may be developed in a ferrous oxalate or amidol developer. I prefer the latter, using exactly the formula given above for developing the negative, except that a little more bromide is added. The paper should first be immersed in water and then developed. The image should appear gradually, neither too fast nor too slow, if one desires to have pure, and not gray, blacks. From the developer the paper passes to pure water, and is then immersed in a bath of very dilute acetic acid, again washed and finally fixed for ten minutes in a twenty per cent. solution of hyposulphite of soda. This is very long to read, and the operations appear somewhat complicated. A simple example will suffice, I believe, to show that, with a little practice, the work of enlarging is as expeditious as it is simple. I have been able to make in one day, one hundred and twelve 18 x 24 enlargements from eighteen 6½ x 9 negatives.

DEVELOPERS.

By P. C. Duchochois, New York.

NOTWITHSTANDING the numerous developers introduced within comparatively recent date, Pyrogallol still holds first rank among professional photographers, for, according to the manner in which it is employed, it permits one to obtain at will contrasts or softness by simply altering its percentage, and that of the alkali, in the developing solution. For example, every one is aware of the difficulty of developing, with sufficient detail, the latent image which is the result of an instantaneous exposure, and how much this difficulty increases as the exposure is diminished. Now, if the developing solution be compounded with one grain or half a grain of pyrogallol to the ounce of water, and the usual dose (for short exposures) of carbonate, all the details which can be brought out will be obtained.

Instantaneous exposures made with shutters working at medium speeds may be treated with a solution containing one grain of pyrogallol to the ounce. Those made at great speeds ($\frac{1}{100}$ of a second and less) should be developed with half a grain, or even less, of pyro. to the ounce of water.

For ordinary, that is, for time exposures, the best method of operating is to immerse the plate in a solution of 2½ grains of pyrogallol and 25 grains of sulphite, and then to add, at intervals of about half a minute, small doses of a saturated solution of sodium carbonate (pure) until the details appear, and from this moment to let the action proceed.

This developing solution may be used again, whereby somewhat greater contrasts may be obtained. But for instantaneous exposures a fresh solution, compounded as directed above, must be employed to develop each negative, and it is advisable, when the solution becomes colored, to replace it with fresh, prepared in the same manner, *i. e.*, with a small dose of pyrogallol.

Next to pyrogallol, eikonogen is probably the best developer. It yields soft negatives, sometimes bordering on flatness. For this reason it is often used in combination with hydroquinone, which possesses the opposite property, and a caustic alkali.

The action of these two developers is not much altered by the presence of a bromide, except at certain doses, while that of pyrogallol is perceptibly counteracted by the small dose of one-half a grain to the ounce of developing solution. A little bromide is always beneficial to avoid a slight superficial veil at the beginning of the development, especially when using extra rapid plates. The following is a formula for developing very rapid exposures with eikonogen:

Sodium Sulphite, granular	20 grains.
Eikonogen	6 "
Potassium Bromide	⅓ "
Sodium Carbonate, granular	15 "
Water	1 ounce.

The development is slow and the negative does not become too dense in the high lights. When all the details are well accentuated, a few drops of a twenty per cent. solution of caustic soda may be added.

Hydroquinone is chiefly used by amateurs. There is no doubt but that it will yield good results if used with large doses of carbonate or with the caustic alkalies. We seldom use it for the development of objects not well lighted or *a fortiori* of instantaneous work. We nevertheless give a formula for the development of time and instantaneous exposures. As will be seen, it is an energetic developer, unlike those above described:

A

Sodium Sulphite, cryst	40 grains.
Hydroquinone	12 "
Water	1 ounce.

B

Sodium Sulphite	15 grains.
Caustic Potash	25 "
Water	1 ounce.

For instantaneous exposures made at ordinary speeds, dilute A with one ounce of water and add half an ounce of B. For very rapid exposures, develop with a mixture of equal volumes of A and B.

Apropos of instantaneous work at great speeds, I will observe that the Focal plane shutter answers very well. It works in front of the plate, and, being constructed on the principle of the guillotine, the illumination is more equal over the plate than where the shutter opens from the center.

THE PERSPECTOGRAPH.

By Le Commandant V. Legros, Paris, France.

MANY photographers, amateurs as well as professionals, are firmly convinced that they are not obliged to consider the laws of perspective, believing that photographic perspective, so far as they are concerned, may be left to the lens to take care off. They imagine that after acquiring an accurate lens, or after paying enough to warrant the supposition that it is accurate, they have paid over and above for the right to expect, under all circumstances, irreproachable images, without exercising in any manner whatever their own judgment. The most casual observation, however, suffices to show that the lens is not infallible, and that some knowledge of perspective is not less indispensable to the photographer than to the painter himself, in order that errors most damaging to one's reputation may be avoided. In the show window of a celebrated photographer we saw a series of portraits of young women, the background to which was a marine view, the horizon line cutting the bodies exactly in half. If such an incongruity were the result of anything but ignorance and flagrant carelessness on the part of the operator, it would justify the persons so outraged in publicly denouncing the artist (?) who had thus laid himself open to blame. It is evident that in such a case the designer of the background was most to blame. This individual should be a specialist, well up in the niceties of his art, and one who should understand that a marine view, to serve as a background for portraiture, should not be painted the same as one in which the figures are only accessories. Ignorance of the most elementary principles of perspective becomes most flagrant when it is met with in those who pose as professors or critics of artistic or photographic perspective.

Our attention had moreover been directed to the remarks made above, through an interesting article by the editor of the *British Journal of Photography*, in the International Annual of 1891, page 425. It caused us no little surprise to find in the *British Journal Almanac*, 1893, page 643, published under the same editor, an article by G. Bankart, entitled "The Low Line of Sight," the object of which seemed to be to demonstrate that by simply lowering the photographic apparatus, and without any mention whatever of the de-centering of the lens, one reduces the exaggeration of the foreground perspective.

This belief is so widespread, that in our "Eléments de Photogrammetrie" we have deemed it our duty to devote a whole chapter to explaining its origin and demonstrating its absurdity. Unfortunately though, in writing this little book, our object was to show that the really practical part of photogrammetry was within the reach of scholars of the most elementary schools, and such a demonstration as this under discussion cannot properly be made without a geometrical figure, whose very appearance would cause the majority of readers to reject the book.

There is a way of promptly reaching the solution of all problems of practical perspective, without the employment of any figures or demonstration. This is by the use of the apparatus known as the Perspectograph or Perspectometer. This instrument consists principally of a rectangular frame on which is stretched transparent gauze. This frame is supported on a stand resting on a table, or directly on the ground, allowing it to be placed in a vertical position. Facing the frame, and fastened to it or not, is a vertical curtain rod, carrying at its upper end a blackened iron plate through which a small hole is punched, so that one may look through it. According to the picture, this aperture can be moved to different distances and heights, corresponding to the use of lenses of different foci and to the various displacements of the lens in relation to the center of the ground-glass. On the side of the frame is attached a horizontal rod, or simply a piece of string which can be drawn up on both sides, to reach the height of the center of the aperture. This represents the horizon line, which plays an important part in a great number of problems. Our figure represents Muret's Perspectometer, which forms part of the instructive outfit of Editor Delagrave. But any one can readily construct a similar piece of apparatus, of dimensions and with a support, best suited to his circumstances. A few curtain rods, a piece of gauze or embroidery muslin, and a piece of an old jelly box, better thus employed than in forming part of an Anarchist's bomb.

Some fifty years ago a drawing teacher, Madame Caré, following the example of Leonardo de Vinci, used this instrument for instructing her pupils. The apparatus was arranged facing the subject to be reproduced—landscape, sculpture, picture, etc.—and the pupil, looking through the small aperture, filled in the gauze with a stub where the picture showed thereon. On laying the gauze on a piece of paper and pressing it gently, the sketch was reproduced on the paper. After the first few lessons this should only serve as a guide, and the pupil should endeavor to reproduce it by placing himself in the same condition regarding the point of view, but without the aid of the perspectograph.

This method will be found of service in new countries where good art teachers are not so common as is desirable. But our object for the present is to recommend the apparatus particularly to photographers. After becoming familiar with its use, they can without any difficulty solve all problems that may arise in their practice. Those who desire to communicate their views to the press could easily avoid falling into error. The Perspectograph is a valuable aid to any one who must practice the art of drawing without having the knowledge of a professor of geometry, and it can truly be said that the photographer should not fail to avail himself of it.

A METHOD OF PREVENTING HALATION.

By F. F. Braillard, Jr., Brooklyn, N. Y.

HOW many times have we wanted to take pictures of a room that had windows on the side that we wanted to photograph? And as we did not want to get a dozen so-called non-halation plates in order to take one negative, or our stockholder has just told us that he was "all out" of these plates, but expected some next week, we have had to give up the idea, or else have a negative in which a large white blotch occupied the position of the small window. In such a case our picture has been a failure photographically.

Some people maintain that the only way to produce a good photograph of a room with windows, is to use a non-halation plate; others of equal authority recommend a plate with a backing to absorb the rays of light that cause the halation. Now, whose advice shall we take? If we buy plates ready prepared, they will cost much more than the plates we usually use, and if we try to make a backing we are liable to ruin the plate entirely.

If the readers of the Annual will try a very simple dodge, that I have used for the last four years very successfully, I think that they will have more satisfactory results than by any other method. Use the plate that you are accustomed to, a slow one being always preferred and one that you can hold under perfect control. Now set up the camera so as to take in the view wanted, being sure that the windows are not directly in front of the lens, as this will cause fog, and focus. In dimly-lighted rooms use a candle to focus by, placing it one-third of distance between background and camera. This I have found will make the entire negative sharp from end to end, when the lens is stopped down. As to the stopping down, place the candle, after focusing, in one corner of the room or in the background, and use the stop that will give a sharp image.

Expose for the darkest corners, using, if convenient, a small hand mirror to reflect light into them during exposure. Never mind the windows. Now as to developing. Let us by all means take our time, use plenty of safe light and have running water. Use any developer that you can thoroughly control, having four or five times the quantity of water and next to none of the alkali. Rock the plate in this weak developer until the windows begin to appear. Let them develop up until they are not quite so dense as is wanted. Now pour off the developer and flow over the plate water to which a few drops of potassium bromide solution have been added. In about a minute, pour this off and wash with water. Drain off all the water, and, with a good blotter or an old pocket handkerchief, remove the last traces of superfluous water. With a soft camel's hair brush paint the windows with a saturated solution of potassium bromide, being careful that it does not run over on to other parts of the plate. If you paint a line around the edge of the window, and then fill in the middle no running over will occur. Have the plate perfectly flat. Let the bromide soak in well, then wash off and develop as usual. If this plan is followed when the plate leaves the hypo. you will have the room and the view outside of the window both perfect, and people will wonder how it was that the windows were not over-exposed.

PLATES FOR HOT WEATHER.

By J. C. Jackson, Jersey City.

DURING the heated term of every summer, every photographer, amateur and professional, is annoyed with frilling, puckering, or even the entire detachment of the film from its support. Alum, chrome alum, tannin, epsom salts, ferric salts, the acid fixing bath and a host of other remedies, have been recommended to counteract the evil. These remedies are very good in a measure; but when the sun will insist upon pouring down upon us heat rays averaging from 95 to 100 degrees in our latitude, these palliatives are of but little value, and the film comes off anyhow when water or developer reach

NEGATIVE BY J. A. BRUSH

COPPER ETCHING BY M. WOLFE

THE LITTLE PHILOSOPHER

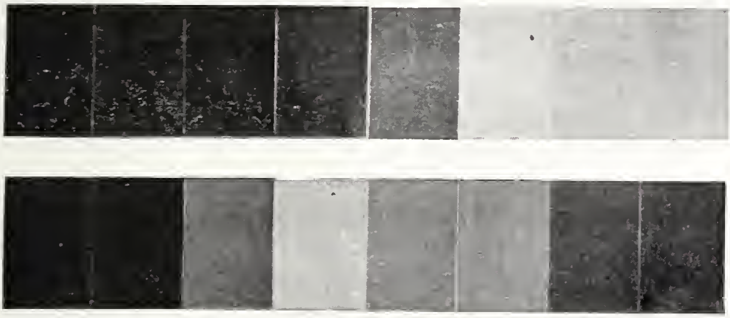
a temperature higher than 82 degrees Fahrenheit. I have recently been trying the Eagle Equatorial plate, and find that it stands well a temperature far above the highest that the photographer will ever encounter in his labors. Even in boiling water the film adheres tenaciously to its support, whether glass or celluloid.

The temperature of this country and those to which American plates are exported, averages hardly 125 to 130 degrees Fahr. These equatorial plates behave equally well in warm as in cold climates, being apparently entirely unaffected by heat. The speed of the plate is not sacrificed by this improvement, and my results have been in all instances excellent. I commend them to all who are troubled during the "dog days."

COLOR SCREENS.

By T. C. Roche, New York.

I USE for coating the plates for color screens the fine soluble cotton, such as is sold by your publishers, dissolving two and a half grains of cotton in each ounce of solvent (equal portions of ether and alcohol). This collodion should be made some time before use,



BLACK. R. O. Y. G B. I. V.

and should be allowed to stand to allow any particles of solid matter to settle. I use thin polished plate-glass, selecting pieces free from scratches and specks. After cleaning, I coat these plates with the above collodion, to which a suitable coloring matter has been added. When dry, they are covered with a piece of the same plate-glass, and bound together with gummed paper, just as with a lantern slide.

For all ordinary outdoor work, in connection with orthochromatic plates or not, I prefer a good yellow. This I find in Auramine, O. I keep a strong solution in alcohol and add enough of it to the alcohol to suit.

For copying colored work, where several different effects are required in the negatives, I use plates coated with the above plain collodion, some dyed with Methyl Violet, others with Emerald Green and others with Erythrosine, Y., extra. I find that plates coated, one with Auramine and the other with Erythrosine, make a powerful screen when mounted face to face, shutting out nearly all of the blue rays.

Screens should be perfectly transparent, and may be fastened, just behind the lens, by cleats nailed on the front board. I have some large screens which fit in the holder in front of the plate.

The time of exposure depends, of course, on the source of light. If, without a screen, twenty-five seconds were necessary for a copy indoors, the introduction of the yellow screen would necessitate about seventy-five seconds. The combined screen might require five to six minutes. The violet screen does not seem to affect the exposure. The green, if not too intense, works about the same as the yellow. In all cases orthochromatic plates should be used. Where a single negative is made the general tone of the picture must be considered when selecting the screen. The accompanying half-tone shows two photographs of an artificial spectrum, one made on an ordinary plate without a screen, and the other on an orthochromatic plate with color screen.

FROM HEAD TO FOOT YOUR BEST.

By Edward L. Wilson, New York.

THIS is not a howl. I only want to plead for a little more carefulness—more conscientious attention to details. About nine-tenths of the photographs one sees in these days of hurry-scurry are sent out without proper care having been given to their production. You may answer, and with a fair amount of justice, too, that my remark is not worth regarding, because in almost any business the bulk of things which are done are badly done—imperfectly, carelessly done. But from art—elevating, refining art—we expect better things; so I return to my argument and offer an illustration or two.

I have before me two photographs which are technically excellent, yet by no means faultless. One is of a lady, and is entitled "A Study in Posing." She stands, hat on, with her arms extended, holding an umbrella, closed, diagonally across her hips. The masses of light and shade represented by the head and hat are excellently managed—quite Rembrandtesque—the lines of the dress have had good care, and the accessories and background are carefully chosen; but that umbrella has damaged and discounted everything. To accommodate it, the right arm and hand are pushed out of all naturalness and the left one is given the usual pump-handle pose. Thus the young lady has a pilloried look, constrained and painful. In her left hand she holds a dark glove. This has fallen upon the stick of the umbrella, in such a way that some of the fingers fall so naturally as to look like an extension of the fair one's hand, dipped in some dark solution. The eye is directed to this distortion at once; it is the worst oversight in the picture.

The other illustration is a picture of a sturdy looking youth, standing full-length, clad in football costume. There is determination in his eye; a star upon his breast and a football hugged to his side by one arm, while the thumb of the other hand is thrust behind his belt. It would have been a masterpiece in photography but for an inexcusable bit of carelessness on the part of the master. This lies in the posing of the young athlete's feet and legs. He stands at what, in military parlance is called "parade rest," one foot and leg supporting the body mainly, while the other, with bended knee, is brought forward. There are many cases when this would have been all right; but in this instance the operator forgot the focus of his lens. As a consequence, one leg appears about one-third less in diameter than the other, and there is quite as great a difference in the size of the feet. The small leg is the first thing you see when you look at the picture, and you are forced to conclude that if the stalwart model can play football at all he must be forced to limp through the game.

Now, back to my point of observation: there is too much neglect of attention to the small, but very important, details by picture-makers—even by the first-rate ones. I will not try to explain the causes of this. They are numerous; but they can all be overcome by the use of *more head.*

The human mind becomes familiar with the proper forms of things by observation, through that delicately formed camera, the eye, which, through the optic nerve, carries the impressions received to the mind or understanding. The artist photographer, therefore, should endeavor to represent these forms as they impress the eye, and, by its means, the understanding. Photography and Fact are twins; but if the first attempts to distort the second, the mind will detect the sin and reject the result as wrong. Attention to details, then, is what I insist upon. I wonder if I have made my meaning clear?

One of my art instructors used to say, "The artful way of making use of the lines and ornaments of a dress, so as to carry the attention unobtrusively to the head, is an accomplishment peculiarly valuable in the composition of a portrait. To do this successfully requires intelligence and taste, and very often qualities of distinction and elegance are gained by the right use of just such means." A little more might be added for the special use of the photographer—viz.: Remember the focus of your lens; examine all the *little* things before you expose; let what you do be—from head to foot, your best.

HOW TO MAKE AN ARTISTIC PICTURE.

By Mrs. Cyril H. Burdett, Brooklyn.

ALL amateur photographers are not artists, yet there is no question but what the large majority of them might, by heeding the fundamental laws of composition, improve the artistic quality of their pictures. There is too much reckless "snapping" here and there without any regard to the character of the result; it is only by a stroke of luck that once in a while a real picture is made, and even then the photographer is entirely unaware of it. With a knowledge of the laws of composition, however, he would find more satisfaction in obtaining one good picture than in taking a hundred careless snapshots, while the artistic side of photography would profit thereby. The following simple rules should be kept constantly in mind.

All lines in a picture must be balanced, otherwise certain parts will appear unsustained and the picture incomplete. For instance, in a landscape with trees in the foreground at the left, mountains in the distance, and a lake at the right, the general direction of the lines of the trees may be vertical, or inclined, and the line of the mountains diagonal; but unless there are counteracting lines to balance them, both trees and mountains will appear top-heavy and convey the impression of falling into the lake. This can be remedied by introducing in the foreground at the right, a boat or yacht, the lines of which shall oppose those of the trees, and a few clouds in the sky contrasting in direction with the mountains. Of course it is seldom that the appropriate cloud appears at the right time, but, by keeping a collection of cloud negatives in stock, one may print in the clouds afterward. A boat may not happen to be at hand, but a rock or an old tree stump may often be found to serve the same purpose. By taking a few steps one way or the other, desirable objects will frequently be brought into view.

In taking a picture, the position should be selected with great care. There is always more than one way to look at the same scene. To illustrate; if a rural view, with an old ox-team approaching, is taken from directly in front, the road will divide the picture in halves, with the ox-team in the center, and very much distorted by perspective. But, if a view more to one side is taken, the effect will be improved. A square front view of anything is seldom artistic. A house looks better if a little of one side is shown as well as the front. A portrait is also improved by placing the sitter at an angle to the camera.

In a landscape the horizon line should not divide the picture exactly in halves; a third of the distance from bottom to top is better. If there is one object of interest it should never come in the center of the view, for the center is always considered the weakest and least effective spot. The strongest points are at unequal distances from either side, and from top to bottom. If there are several objects of interest, one should be made more prominent than the rest by placing it in some strong point in the foreground, with the subordinate ones in less effective situations in the background, but never exactly opposite or over the chief object.

The management of light and shade is somewhat difficult for a beginner, but a little experience will enable him to judge how the best results are obtained. The light should not divide the picture in halves, either horizontally or vertically, but should fall diagonally, so as to make wedge-shaped masses of contrasting light and shade. In some cases, where a large portion of the picture is in shadow, contrast will be effected by having some object of interest placed in the highest light in the foreground. This contrast of light and dark objects sometimes takes the place of balance. If the trees, mountains and lakes, in the scene before described, were mostly in sunlight, the dark rock or boat would be sufficient to balance them. A dark or light object in the foreground also serves to increase the effect of distance. It should not, of course, come in the center.

The time of day for photographing any scene is an important consideration. There are no Joshuas in these times to command the sun to stand still, and therefore no scene ever presents exactly the same aspect two minutes in succession. The masses of light and shade are constantly changing, and the artist photographer will patiently wait until the scene he desires to photograph is so lighted as to give the most pleasing effect.

There are laws of unity which should also be observed. A picture must have a reason to be, and must tell its own story. The parts must be related one to another, so that they form a united whole. An elephant in a parlor is conceded to be out of harmony with his environment, but hardly more so than some of the figures ignorantly introduced by amateurs amidst unsuitable surroundings. A scene from the Yosemite Valley, representing one of the grandest views of nature, may be utterly spoiled by a human figure directly in the foreground, gazing into the camera. The grandeur of the landscape appeals to the feelings of the spectator, and the eye is naturally drawn to the principal features. A human figure, placed so prominently as to distract the attention, is out of harmony with the scene, and consequently destroys the unity of the picture. When a landscape is of itself sufficiently interesting or impressive, all figures should occupy subordinate positions; but when it is desired to bring out the figures with strong effect, a less attractive landscape should be chosen. In taking groups, the figures should not be scattered around at random, but should bear some relation to each other as do parts to the whole. The light and shade should be arranged in broad masses, graduating from the highest point of light to the darkest of shade, and never separated in spots of equal intensity. Only by careful attention to these details will the effect of unity, or that feeling of completeness so essential to an artistic picture, be produced.

In brief, therefore, the few simple rules for the amateur to observe are, Balance of Lines, Contrast of Light and Shade, and Unity, and to aid in the observance of these rules, the following suggestions are offered for guidance. First: Select a position from which no line shall divide the picture exactly in halves. Second: Place the object or objects of interest in effective points—at unequal distances from the center and never directly in the center Third: Choose the time of day when the scene is most effectively lighted Fourth: Subordinate all figures when the landscape is of paramount importance. Fifth: Have all parts of the picture related harmoniously.

There are other subordinate rules which might be of assistance, but the few principal ones already stated are enough for the amateur who desires to improve the standard of his work, and who is sufficiently interested in the future of photography to make some effort toward the production of artistic pictures.

TIMING SHUTTERS.

By Jas. E. Boyd and Thos. E. French, Ohio State University.

TO any one who has had experience in the use of shutters in "instantaneous photography," it is unnecessary to mention the importance of knowing the time of exposure of each, in order to determine which to use in a particular case, and to the beginner who finds moving objects in his picture apparently "enveloped in a fog," because the time of exposure was too long, or indistinct for want of light when the time was unnecessarily short, one only needs to suggest that had he known approximately the time of his shutter and the velocity of the moving body *across* the field of view, a little arithmetic would have enabled him to make that disposition of his equipment which would give the best result.

Some, no doubt, are deterred from timing their shutters by the mistaken idea that the experiment is difficult to perform, and the calculations hard to make. Believing that an example from an actual experiment is always more interesting than an abstract case, we give below an account of some work in this line which we have recently done, with the calculations for each.

Three methods were employed, that of the tuning fork, the falling ball, and a third, in which reflecting surfaces were made to revolve rapidly at the ends of arms connected to the shaft of a motor.

For the sake of comparison one shutter was timed by each of the three methods, and the examples given below are taken from this shutter.

A tuning fork whose vibration frequency, as determined by comparison with the standard forks of the Physical Laboratory, is 250 per second, was supported so as to vibrate in a vertical plane. A

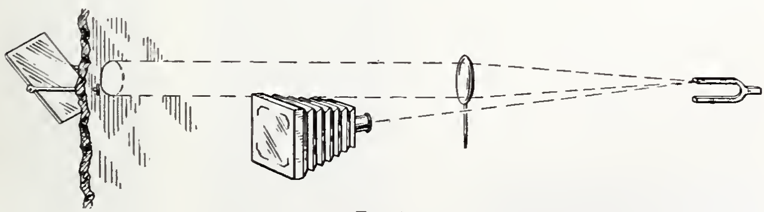


Fig. 1.

small piece of wire, the extremity of which had been rounded and polished, was fastened to the end of one prong. Sunlight, thrown into the room by a plane mirror, was concentrated upon the end of this wire by a short focus lens. This gives an intensely bright spot, which becomes a line when the fork is in vibration. Now, if this spot be focused upon the ground-glass of the camera, and either the fork or plate be moved horizontally in a direction perpendicular to the line joining the two, a wave-line is produced by the vibration of the fork. In our work the plate was moved by rotating the camera. The exposure was made so as to bring the image as near as possible to the middle of the plate.

Figure 2 gives the result for one shutter, belonging to the Photographic Department of the University, which we will call shutter A. To get the number of vibrations we measured the distance through which the plate had traveled, during the exposure, the line a, b of Fig. 3. This in Fig. 2 is .68 inch. Then we measured the length of the whole waves, by placing a scale with its edge in the position represented by the dotted line c, d, Fig. 3. The length of two waves in Fig. 2 is .422 inch.

FIG. 2.

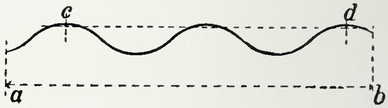


FIG. 3.

$$\frac{.68 \times 2}{.422} = 3.22 \text{ vibrations.}$$

And since the time of one vibration is $\frac{1}{250}$ or .004 sec., the time of the shutter is $3.22 \times .004 = .01288$ sec. Another experiment with the same shutter by this method, gave the time as .01304 sec. The same method gave result of .01188 and .0112 sec. for shutter B.

The tuning fork method has several advantages. The point vibrating through a small space may be highly illuminated, so that there is no uncertainty as to the beginning or end of the line in the photograph.

If proper screens are used, and the room darkened, several successive exposures may be made on one plate by merely raising or lowering the lens. Simply by counting the number of complete waves, we determine the greater part of the time beyond question, provided we know the rate of our fork. The higher the vibration rate of the fork the less relatively is the part in which there is possibility of error, and the greater the accuracy of the result.

On the other hand, unless some automatic means is provided for snapping the shutter, one is liable to miss the plate occasionally.

Our method of moving the plate by rotating the camera by hand, is open to the objections that the velocity of rotations is likely to be variable, and since all points on the plate are not at the same distance from the axis, they cannot have the same velocity, even if the angular velocity be uniform. However, if the camera be fastened to some heavy body so that the optical center of lens shall lie on the axis, a fairly uniform velocity of rotation may be obtained, and the other correction, which, after all, is a small matter, may be conveniently applied.

The waves may be made of exactly the same length by a simple mechanical device. Fasten the camera to a light board, free to rotate about an axis, through the optical center of the lens. Arrange an arm projecting from the board, so that it may engage a convenient body moving in a straight line with a uniform velocity. Make the line of contact of body and arm for that part of the motion in which the image of the point may fall on the plate, a straight line, which produced, passes through the axis, and normal to the direction of motion of the body when the image is at the center of the plate.

With this arrangement no corrections whatever are required for exact results. Several automatic devices for snapping the shutter will suggest themselves to the ingenious reader, by means of which the exposure may be made at the proper time with certainty and convenience.

FALLING BALL.

A silver-plated brass ball, about one inch in diameter, was allowed to fall in front of a scale in the sunlight. The scale used was made of drawing-paper blackened with crayon, narrow spaces one-tenth of a foot apart being left white for the scale divisions.

Figure 4 is one of the


FIG. 4C.


FIG. 4.

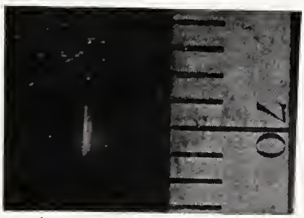


FIG. 4B.

results obtained. In this the line produced by the bright spot on the ball begins .02 inch below the top of division 25, and ends .04 inch above division 28. Since the divisions on the negative are one-sixth of an inch apart, the line begins at a point .12 division below 25, and ends .24 division above 28.

The center of the ball at the beginning of its descent was 3.65 feet above zero of the scale, while the spot, when the ball was viewed horizontally, was .02 feet above the center or 3.67 feet above zero of the scale. (The correction is immaterial, for a difference of ¼ inch in the starting position does not change the calculated time of the shutter by one-tenth of one per cent.).

The ball had fallen a distance of 3.67+2.512 or 6.182 feet when the shutter opened, and 3.67+2.776 or 6.446 feet when the shutter closed.

The distance a body falls in a given time is equal to 16.08 multiplied by the square of the time.

$$h = 16.08\, t^2$$

$$t^2 = \frac{h}{16.08}$$

$$t = \sqrt{\frac{h}{16.08}}$$

The time required for a body to fall a given distance is equal to the square root of the quotient obtained by dividing the distance in feet by 16.08.

$$6.182 \div 16.08 = .38445$$

$$6.446 \div 16.08 = .40087$$

The square root of .38445 is .62004.
The square root of .40087 is .63314.

The difference .01310 is the time of the shutter in seconds. Another result for the same shutter, shutter A, was .01316, and the value for shutter B obtained in this way was .0119.

There are two corrections which somewhat modify this. Instead of the reflecting surface being in the plane of the scale, it was at a considerable distance in front of it. The sunlight which was reflected into the lens at the end of the exposure came from a point on the ball higher up than at the beginning. In the example given the lens was on a level with line 31 of the scale, and six feet in front of it. The center of the ball was one inch from the scale. The altitude of the sun was 54°.

In Fig. 5 *s*, *b* is the incident light, and *b*, *l* the reflected light at the opening of the shutter. The distance *k*, *g* .588 feet, divided by l, g 6 feet, gives the tangent of angle b, l, g as .098. The angle b, l, g is $5^\circ\ 36'$.

In the same way the angle b, l, g is $3^\circ\ 6'$.

Angle s, b, $l = 59^\circ\ 36'$.

Angle s', b', $l = 57^\circ\ 6'$.

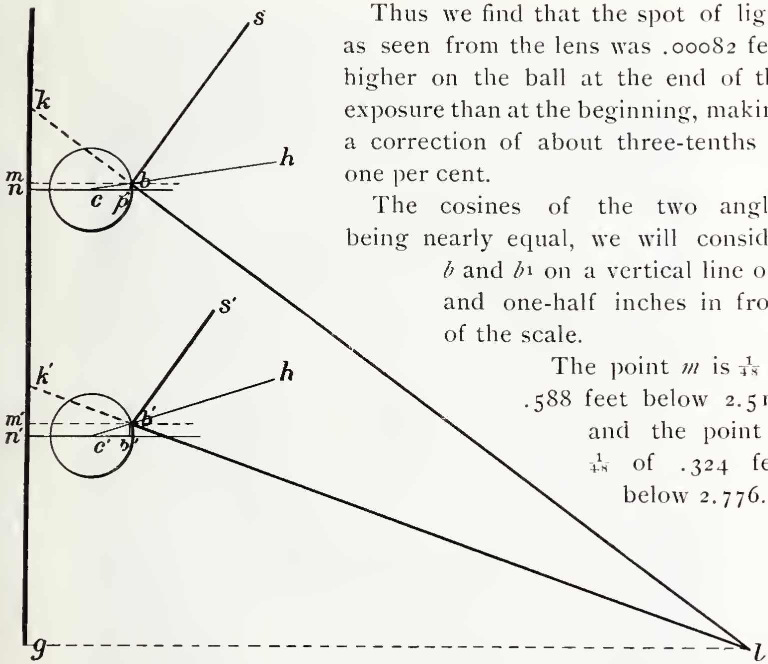
The radius produced c, b, h, bisects angle s, b, l.

The angle h, b, r = angle b, c, $p = 24^\circ\ 12'$.

Likewise angle b', c', $p' = 25^\circ\ 27'$.

The radius c, b being .5 inch, the line b, p = .5 x sin $24^\circ\ 12'$.
= .20496 inch = .01708 ft.

b', p' =.0179.



Thus we find that the spot of light as seen from the lens was .00082 feet higher on the ball at the end of the exposure than at the beginning, making a correction of about three-tenths of one per cent.

The cosines of the two angles being nearly equal, we will consider b and b_1 on a vertical line one and one-half inches in front of the scale.

The point m is $\frac{1}{48}$ of .588 feet below 2.512, and the point m $\frac{1}{48}$ of .324 feet below 2.776.

Fig. 5.

$$3.65 + 2.512 + .01225 + .01708 = 6.19123.$$
$$3.65 + 2.776 + .00675 + .01790 = 6.45065.$$
$$\sqrt{6.19123 \div 16.08} = .62050$$
$$\sqrt{6.45065 \div 16.08} = .63336.$$

.63336 —.62050 .01286, the corrected time of the shutter.

If the ball be dropped to one side of the scale, Fig. 4b, instead of in front, especially if it be allowed to fall in such a way that its center is about one-fourth its diameter behind the plane of the scale, no correction whatever is necessary, provided the sun is not too low.

Some of our work was done in this way; two results for shutter C were .0097 and .0096 second.

In this case any scale may be used.

The ball used in this part of our work was of brass, 1¾ inches in diameter, polished, and amalgamated in the usual way by dipping in dilute sulphuric acid and rolling in a bath of mercury. Professor Bradford has obtained good results by using a marble wrapped with tinfoil. Any spherical body of moderate density, and having a good reflecting surface for the violet end of the spectrum, may be used.

REVOLVING POINTS.

The fan was removed from a fan motor, and in its place was put a

Fig. 6.

light wooden bar about ten inches in length. Two hollow glass beads, coated inside with amalgam so as to form a good reflecting surface, were cemented to the bar near the ends, and at slightly different distances from the center of the shaft. Just back of the bar was fixed a sheet of drawing-paper upon which was a graduated circle, the center of the circle coinciding with the center of the motor shaft. Inside this circle was a band blackened with crayons, forming a lusterless background for the beads.

In Fig. 6 the outer arc extends from 145 to 346, an arc of 201°, while the inner from 322 to 161 an arc of 199°. Taking the mean 200°, we have $\frac{200}{360}$ or $\frac{5}{9}$ of the time of one revolution as the time of the shutter. The motor was making 1000 revolutions in 23 seconds, or one revolution in .023 second; $\frac{5}{9}$ of .023 = .01277, the time of shutter A.

Another result from a negative taken at the same speed, was .01296. Two others, at a slower speed, gave .0125 and .0124 for the same shutter.

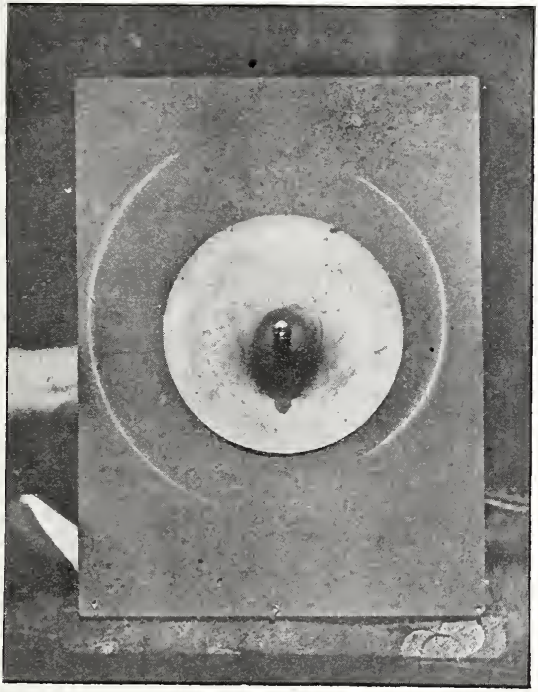


Fig. 6b.

Two exposures were made with shutter C, and the results were .00968 and .0094 seconds.

It will be observed the arcs are slightly eccentric. This is due to the fact that the beam of light reflected from the bead to the lens, always comes from a point above the center of the bead. The larger the bead and the greater the altitude of the sun, the greater this eccentricity becomes. Figure *6b* shows this to a greater degree. Here the reflecting surfaces were tin knobs, whose radius of curvature was about one-half an inch. The eccentricity may be reduced to a minimum by using small spheres as reflecting surfaces, and throwing the sunlight upon them as nearly as possible perpendicular to the plane of rotation. This is at the expense of diminished brilliancy of the spot of light.

In our work the motor used was a small one, and since its only load was the rather unsteady pressure upon the revolution counter, its speed was somewhat variable. Given a rotating body having a constant velocity, and this method becomes one of the most accurate as well as the most convenient to use. If one had a large number of shutters to time, it might be profitable to construct an arrangement by which the plate could be rotated at a known rate. The source of light could then be highly illuminated, and there would be no uncertainty as to the ends of the line. The light might come from the end of a vibrating tuning fork, and thus two results be obtained from the same negative.

A comparison of the results obtained will show that any of the methods, if used with ordinary care as to the experimentation and with no corrections in the calculation, will give results which differ by only a small amount from the probable time of the shutter. While it is necessary to know the time of your shutter approximately, an error of two or three per cent. is immaterial for ordinary work, so that whichever method is the most convenient may be used, and calculations based upon the time obtained will enable you to determine with certainty which shutter to employ in any given case.

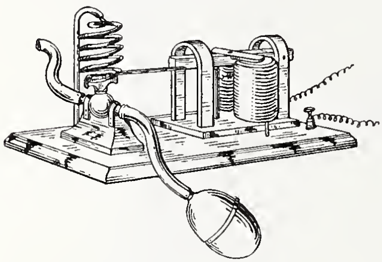


Fig. 7.

In using the first two methods, it is convenient to have some automatic means for snapping the shutter, especially if small plates be used. Figure 7 represents a device which we found reliable for that purpose. A two-way cock attached to a spiral spring was placed between the bulb and the shutter. An arm fastened to the cock is in contact with the part supporting the spring when the cock is open. A common telegraph sounder is so placed, that when the armature is held down by a current in the coils it may engage the arm and keep the cock closed. When the current is broken, the arm is released and carried around to the post by the spiral spring, thus opening the cock very quickly. If now a steady pressure is applied to the bulb, the air thus suddenly released snaps the shutter. In the case of the falling ball, a second ball allowed to fall at the same time opened a simple break circuit in series with the sounder. This arrangement was placed a little above the highest point of the scale which came into the field. Two exposures were made, with the starting point 18.6 feet above zero of the scale. In both cases were the exposures within a few inches of the middle of the scale (see Fig. 4*c*). When the tuning fork was used the rotating camera broke the circuit. In using the third method, the reflecting surfaces are always in front of the lens. In Fig. 1 the scale divisions are indistinct near the top; this was caused by a vibration of the board which held the scale. In snapping the shutter by hand, watch some point a little above where you want to catch the ball, and do not try to follow it from the start.

In conclusion, we would say that there is no better practice for any one who wishes to become proficient in handling a shutter, than attempting to catch in two or three feet a ball which has the velocity acquired by a fall of several feet. If care be taken to avoid jarring the camera, and a good background provided for the entire field, a number of exposures may be made on the same plate, so that the cost of plates need deter no one from timing his shutter, and incidentally getting some splendid practice in its use.

TONING CITRATE PAPER.

By G. Balagny, Paris, France.

THE subject of toning aristotype papers has recently been much discussed in photographic circles. We give our experience with the Lumière paper. There are two ways of toning, one of which is by the combined bath, which yields pretty cherry or carmine red tones. Unfortunately, some persons of high authority have condemned this method. Interesting discussions have taken place on the subject at La Societé Française de Photographie, and we have thought it would be of interest to seek a method of toning similar to that used formerly for albumen paper.

We desired to see what the acetate toning bath, such as is ordinarily used in galleries, would produce. The prints should not be too strong or too weak, but exactly like those on albumen paper. On taking them out of the printing frames, they are trimmed and piled one on the other, and, when in sufficient quantity, are toned. They should not be kept too long, or yellowing will result. Toning day being at hand, the following bath is prepared. Dissolve 30 grams of acetate of soda in 700 cubic centimeters of boiling water. Solution will take place immediately, and then to this add 300 cubic centimeters of a solution of one gram of gold in one liter of ordinary water. We have then one liter of solution, which could be used at once were it cold. We must wait until the normal temperature is attained. The prints, without previous washing, are plunged into a bath of alum fifty grams and water one liter, and allowed to remain therein for fifteen minutes, repeatedly turning them over. The prints are then well rinsed in running water, until the latter shows no opalescence. These operations must, of course, be conducted in a diffused light. This is an important point, for one print may be partly covered by another and be slightly tinted; and this slight tint will show in the finished print.

After washing, the toning bath is poured into the toning tray, this latter being used for nothing but toning. Each print is lifted with the right hand from the washing tray and passed, film side up, into the toning dish, the air bubbles that form at the moment of immersion being removed with a brush. The prints will assume a magnificent sepia walnut tone. When the print is sufficiently toned, it is immersed in a fresh hypo bath made up as follows:

Hyposulphite of Soda	100
Nitrate of Lead (1:100)	10
Water	1000

With a glass triangle, held in the left hand, the print is fully immersed in the hypo. The prints remain in this bath until the toning is completed.

Care must be taken that the right hand touches only the toning bath, and the left hand the fixing bath. We are assuming that prints not larger than 21 x 27 cm. are being toned. For larger prints both hands are necessary, and then neither should be placed in the hypo, but immersion accomplished by means of the triangle. A small trace of hypo in the toning bath may spoil the print beyond redemption.

The rapidity of the toning will be in proportion to the thoroughness of the washing after the alum bath. When all have been toned, the prints will be found one over the other, coated side up, in the fixing tray. We then take the entire pile with both hands and turn them coated side down. The first one is then plunged into the washing tub, then the second, and so on, the water being changed at least six times, either by emptying the tub or by changing the prints from one tray to another, this latter being preferable. They are then allowed to wash for one hour in running water. The prints,

NEGATIVE BY M. B. PARKINSON

ENGRAVED BY J. MANZ & COMPANY

COUNTING PROFITS

having been previously trimmed, can, when they have been well treated with alum, be mounted and placed in a warm place to dry, as with albumen prints.

We may possibly have been somewhat lengthy in our explanations; but we have endeavored to indicate an easy method of toning, which has the great advantage of retaining all the half-tones in the print.

WELL, PERHAPS!

By R. M. Fuller,

General Secretary, American League of Amateur Photographers.

THE old-time photographer who sticks to pyro. and leaves others to "investigate" the merits (or demerits) of the many substitutes which have been forced upon our attention during the past decade, may serve to point the moral of my thought. He usually turns out fair negatives, full of detail, clear in the shadows, delicately modulated in the half-tones, and without "chalkiness" in the high lights. Perhaps they are not phenomenal, but as a rule, taking his work right through, it will be found above the average of amateur work, and its author does not mind being called "an old fogy."

Now, it occurs to me there is a reason for the general excellence of our friend's work which cannot fairly be attributed to pyro. If I am right in my conclusions, it is less the means than the methods of our friend which bring success; in other words, it is his stick-to-ativeness which yields the results you admire. This quality is precisely the thing lacking in the majority of amateur workers.

Perhaps you, my friend, are one of those of whom we speak. Do you admire a beautiful print exhibited by a friend and ask, "What developer do you use?" When this friend replies with some four or six syllabled word—the latest up-to-date production of the chemist—do you jot it down, hie to your stock dealer, purchase a supply and proceed to experiment?

Well, perhaps!

And do you find the result commensurate with the outlay? Do you secure any better results? Are your negatives improved? Perhaps (and probably) not!

Do you make up your mind after all that the new thing is not what you are looking for, and throw it aside, and go back to the old one, until presently some other developing agent is recommended by a "competent authority," and you forthwith repeat the experience with similar results?

Well, perhaps!

Did it ever occur to you that a proficient workman can turn out fair work with poor tools, but that an incompetent workman cannot do good work with the best of tools?

In other words, don't you think, when you reflect upon it, that brain power accomplishes more with a one or two syllable developer than the absence of brains reinforced by a six-syllable agent? To my mind, the "old fogy" is successful not because he uses pyro merely, but because he uses pyro *and brains*. He knows how to handle it; he has become familiar with it; he counts confidently on results *beforehand*, hence he is in no sense an experimenter, he is a workman, who knows what he is attempting to do, and how and why it must be done to achieve the result he proposes.

Now, the moral I want to point does not limit itself to developers by any means, nor do I desire to be understood as speaking for pyro, as against any other developer.

The rule holds good with stops, with plates, with papers, with every article and material with which we have to do, and the burden of the song is, don't be like the swallows which I see from my study window as I write—hopping from twig to twig of the maples outside, and chattering all the while in the most contented and gratifying fashion.

Don't do it.

If you are using a good standard make of plate keep on using it, and never mind if your friend X. Y. Z. succeeds in getting some of the very meritorious pictures on the brand of plates made by a rival maker. If you are using a certain developer—be it pyro, hydro, or eiky—don't change it because A. B. C., who uses amidol or some other "doll," gets better results than you do. Make up your mind that if others get ahead of you, the main reason is they are working more with their heads than you do with your hands.

Chance cannot be a permanent factor in photography.

A person may turn out a phenomenal negative once in a while by chance, but when it comes to average work, and you find nine out of ten negatives turning out results of a high order, and of nearly equal merit, are you not warranted in thinking that something beside chance has played a conspicuous part in their production?

Well, perhaps!

I want to say, too—although it ought not to be necessary—that you must not understand that investigation and experiment should be religiously eschewed. On the contrary, they offer a legitimate field to the amateur photographer; but you should enter this field intelligently.

The chemist experiments, and properly; nevertheless his experiments are not allowed to interfere with nor confound the clearness of his work along the ascertained and established certainties of his profession.

Experimental work should be the result of an absolute familiarity with the dogmatical part of a profession; one should have the A. B. C. of his business at his command before he attempts to go outside the beaten track. So the amateur should know thoroughly the plate, the developer, the paper he is using, before he permits himself to mar his regular work by introducing the insane idea of trying *new* things, simply to gratify his desire for change, or to enter the lists against some friend who has gone beyond him.

Did you ever spend an entire season working with one stop in your lens only until you became thoroughly conversant with just the proper amount of exposure to give under every and all conditions of light on each class of subjects?

If you did this, then at the end of that season you were reasonably qualified to experiment with the other stops, and better able to judge the probable effect beforehand than you otherwise could have been. You can go on multiplying illustrations for yourself *ad libitum*, and they will all point one way—viz., power in photography (as well as in every other avocation of life) is born of knowledge; knowledge is the result of application and practice.

Shall we resolve to put more power in our photographic work this year?

Well, perhaps!

DARK-ROOM ILLUMINATION.

By Reginald A. R. Bennett, M. A. (Oxon.),

Hon. Treasurer of the Oxford (England) Camera Club.

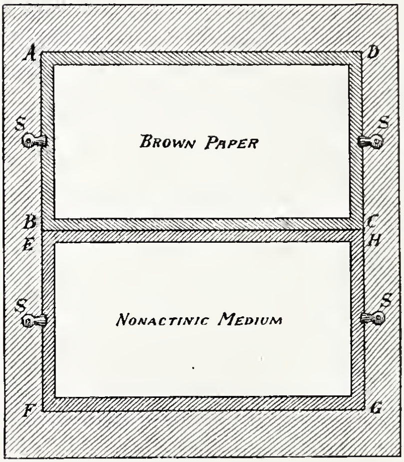
THE above subject, though not possessed of the charm of novelty, is yet one which none of us can afford to despise, from the oldest hand living to the veriest tyro in the art of photography, and it is therefore possible that I may be able to give some help to the latter, and even, perchance, to interest those who are not far from being the former, though they will have formed their own habits of working, and will not easily depart from them.

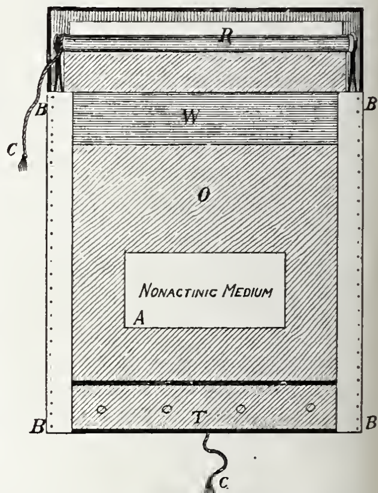
In searching for the best means of lighting the dark-room, we have to consider the rival claims of two materials through which the light has to pass—viz., glass, or fabric of some kind or other; and three principal sources of light—viz., oil, gas, and electricity. I do not think that any one who has the means of lighting his dark-room with the last named need be at any loss to determine which to use. Both in cleanliness and ready adjustment the electric light has enormous advantages over both the other methods of producing light. It can be switched on or off, as required; it can be inclosed in any kind of material without any danger of setting it on fire; it never comes to an end at the most important point of the development, like a candle; it does not smell horribly, like oil, nor make your hands abominably greasy, like either of them; and on these, and on many other accounts, it is undoubtedly the light for the dark-room—if you can get it. But, unfortunately, it is by no means easy to get, for—over here at any rate—we have not as yet, most of us, got electric mains running past our doors. For those who have not this advantage, there are but two ways in which they can light their dark-rooms with electricity—that is, either by means of accumulators or by primary batteries. The former can be made really successful, but they require, of course, occasional recharging. The latter can only be used by those whose pockets are well lined with cash, and who are willing to undergo a time of temporary tribulation while they are learning how to make the battery work. On the whole, I could not conscientiously advise any one to attempt this method of illumination without some practical knowledge of electrical work—certainly not as long as candles remain at their present prices. With respect to the other two methods of producing a light, I certainly prefer a lamp which burns a candle to one which consumes oil. The objectionable smell of the latter makes it highly unpleasant to use in as confined a space as dark-rooms usually are. In a small candle lamp, on the other hand, the candle is apt to rise too far, if actuated by a spring, and to smoke in a truly terrible manner! I would, therefore, recommend those who invest in a lamp of this description to use only candles of hard wax in them, and, if possible, to use a big lamp. Such a lamp has recently been brought out by Messrs. Benham and Froud, but I am afraid that the price of this lamp will prevent many from purchasing it. Whatever kind of lamp is chosen, I would advise all beginners to avoid the triangular form, as it seems to me absurd to have the lamp of such a shape that a shade is cast over the plates when developing, by the center edge of the frame. This obviously cannot occur with the lamps of a square shape, even when the lamp is placed right in front, which is by far the best position for it, especially if the operator has a shade over his eyes. If the lamp is a small one, the best plan is to use a candle simply inserted in a socket, without any spring, as the pools of grease caused by the latter forcing up the candle too quickly are most unpleasant, to say nothing of the smoke.

The following dodge is a good one for those who like to use their ordinary dark-rooms by night as well as by day. A structure has to be made to contain the candle, which may be an ordinary tin biscuit-box, the lid of the box being removed and the box being turned on one side, so that one side is open; this is put next to the window, the box being supported on a small bracket just outside the window. We now have to make a lot of holes in one side and the top of the box, for ventilating purposes. This having been done, a good strong Paraffin lamp is wanted, which is placed inside the box, and the light, of course, shines through the window, which is covered with the usual ruby or yellow fabric. By these means the smell of the lamp is got rid of, and the structure can be made a permanent one by erecting a sloping roof over it, and thus protecting it from bad weather. If gas can be laid on inside the tin, it will, of course, be very much more convenient.

Those who wish to construct a simple lamp for themselves, or whose usual one gets smashed in some out-of-the-way place, where no ruby glass is to be had, can easily make one for themselves out of extremely simple materials, all that is required being an old cigar-box, a piece of non-actinic medium of some sort, a piece of sheet-tin, and some screws. Turning the box up on end (so that one end is now the bottom), we cut a hole out of the front (which was the bottom of the box), leaving about one inch of wood bottom and top and ¼ inch at each side. Now a thick piece of your non-actinic medium has to be glued over this hole to the sides of the box; through this hole, when the lamp is illuminated by means of a candle placed inside the box—the light, of course, comes. The back (formerly the lid) is secured by means of a hasp, to prevent it from coming open at an inopportune moment. An important point has now to be attended to—viz., the ventilation, which is provided for by cutting a circular hole, 2½ inches in diameter, out of the top of the box, and fixing a circular piece of tin, a little larger than the hole, over it, supported on two pieces of tin plate, so as to allow the air to get out at the top, but not the light. Finally a few small holes are to be bored at the bottom, so as to admit air to the lantern, or the candle will smoke. The lamp is to be raised on four small pieces of wood, so as to allow the air to enter at these holes. The candle is placed inside, in a socket, between the holes.

But, after all, there is nothing like daylight, if one can spare time to develop one's plates during the day. As I almost invariably do this myself, I have an arrangement made by means of which I can darken the room whenever required, and which can be instantly removed when not wanted. For the benefit of those who are fitting up dark-rooms for the first time, I here describe the plan I have adopted. Two frames are to be made, the united height and breadth of which are such that when one is placed on the top of the other, they exactly fit the frame of the window, and no space is left between them. The top one of these frames is now to be covered with thick brown paper, and the bottom one with ruby medium, or whatever non-actinic material is to be employed. The edges are best covered with thick cloth all round, so that all light is entirely excluded between the frames and the window. Those who have broad window sashes can fix up pieces of wood to act as "stops," and keep the frames from falling out of the recess. I subjoin a sketch of the arrangement to make matters plainer.





A, *B*, *C*, *D*, represent the top frame, and *E*, *F*, *G*, *H*, the bottom one.

S, *S*, *S*, *S*, are the stops which keep the frames in position. If isochromatic plates are to be used, and yellow medium has been put on the bottom frame for use with ordinary plates, an additional frame should be made to fit in front of the other, and this can be covered with red medium, so that the combined fabrics will be quite safe for the specially sensitive plates. Yellow light, however, will do perfectly for ordinary plates, if two or three thicknesses of fabric are used. Personally I very much dislike working with a red light, and never do so if I can possibly help it. These frames are much better than covering the window with fabric by gluing it on, or using red glass in the window frames, so that the window either cannot be opened, or white light admitted without opening the window. In the first case it is most unhealthy never to have the dark-room windows opened, as the air of the room is sure to become charged with various gases. In the latter case it is a great nuisance not to be able to conduct operations which do not require a non-actinic light in the room without opening the window.

As to the medium, this in the case above will naturally be fabric, in the case of a lamp being used it will probably be glass. Care should be taken that the glass used is really non-actinic, as the cheaper sorts of glass are not always safe. If the reader has a spectroscope, and knows how to use it for this work, he can test the glass best in this way; if not, the best way is by actual experience, the simplest method of doing which is to develop a plate which has only been exposed to the light in the dark-room for a short time at different distances from the light. Five minutes is said to be a sufficient exposure.

There is another method of darkening the window, which takes less time and trouble to manipulate. This is by means of *blinds* instead of shutters. The second of my illustrations will show a way of doing this. A blind (*O*) is constructed of some opaque material—say cloth, or even brown paper if strong enough. This blind rolls round a roller at the top of the woodwork of the window. Down each side of the frame of the window are fastened strips of wood, or thick brown paper, to form grooves, along which the blind travels as it descends. If this is done carefully, there ought not to be any chance of the light escaping at the sides. At the end of the blind is fastened a strip of wood, which is secured to the bottom of the window-frame by hooks or springs, so that it is tightly pressed against the frame of the window and no light can get through at that point. In the center of the opaque material used to form the blind is cut a hole, as shown in the sketch, which is covered with non-actinic medium, sewed on to the cloth, and when the blind is down, this forms our dark-room window. It is best to have a broad strip of wood at the top (*W*), under which the blind passes. This keeps it from becoming creased in its downward progress. Of course, this is a much easier plan than the frames, in certain cases, as the blind has merely to be drawn down, and the room is then ready for use at once. I hope that in these few hints I may have lighted on some ideas which may be new to at least some readers of the "ANNUAL," to which I wish, in parting, all success.

ART OR TECHNIQUE?

By Geo. Comstock Baker, Albany, N. Y.

WHY not both? Well, for two reasons; first, the technical worker often knows nothing and sometimes can learn nothing of art; second, the art worker can often gain a valuable effect by the deliberate disregard of technique. This being the case there should be a sharp division made between the two classes; there is nothing to gain by a conflict between the two parties. All discussion on the subject, "Is Photography an Art?" is now absurd; there are too many examples of art in photography to admit of a doubt.

There is much to gain, I believe, by a general recognition of two separate and distinct classes of amateur photographers, and I think that the technical element would reap as much if not more benefit by this division, as the art workers. At present, except in two notable instances, exhibitions are open to both, with the result that one or the other class must be placed at a disadvantage. A technically perfect photogram goes to the wall under a jury of artists, and the pinhole man gets the cold shoulder from a judge who knows not art. It would seem to be highly desirable that every exhibition or competition have two sets of judges, and that competitors be allowed to elect by what standard they will be judged; an example has been set by the Photographic Society of Great Britain, and I would respectfully suggest that it be universally followed.

If a separate class were instituted for technical and scientific work, we would be spared the sorry sight of microscopic sections of the human liver competing against figure studies, and photograms of flying bullets hung side by side with portraits, and many other glaring inconsistencies which now confront us in every exhibition.

MAKING LANTERN SLIDES UNDER DIFFICULTIES.

By James Shepard, New Britain, Conn., Camera Club.

WHEN we can select the best of negatives for the sole purpose of making slides of a fine quality and of interesting subjects the task is quite easy. I do not mean that no painstaking effort is required, such effort will have its true reward in all branches of photography; but when, in making slides, the object is to produce a complete set for illustrating a given subject, the difficulties are increased many fold. The scenes we desire may be too remote to admit of taking views especially for the slides, and we must work from what we can get, whether good or bad. We may be compelled to resort to prints or engravings from which to make negatives for some of the slides. In copying, it is best to put the photograph or engraving behind a glass in a printing frame, and copy in a room where all the light comes from one side. Set the printing frame at about a right angle to the wall through which the light comes and the camera facing it, so that the unobstructed light will fall between the lens and the print. If there is no other light in the room, and nothing to reflect the light back upon the printing frame, the glass over the print will never cause a flare, and it will in a measure help to prevent the grain of the paper from showing. After a little practice to learn the proper exposure, negatives of any desired quality can be made. I prefer to make the negative in copying of the size desired for the slides, so that they may be made by contact. If the camera is arranged on a sliding frame, it can be much more conveniently handled than when on a tripod. I have seen slides made by copying from a print that could hardly be distinguished from those made from the original negative, and copies from engravings often make beautiful slides.

We may have some good negatives, but both professional and amateur will sometimes have poor ones, and some of the views that are especially interesting will most likely be among the poorer negatives. If the negative is too thin, it should be intensified. I prefer bleaching in the usual way, and fixing with the silver solution. But perhaps the negative is a borrowed one, and the owner will not consent to have it intensified. In that case we make the best slide from it that we can, and if we find it flat, we make a new negative with a lantern slide plate by contact, and then a new slide from said negative. If a negative has good detail, it cannot be so thin or flat but that a good bright slide may be made by means of a second negative. A good slide may be produced in the same way from a flat slide, that is muddy in the high lights, but, of course, we would prefer to work from the original negative if it was accessible. The new negative may be developed with the same developer as that used in making slides. Any standard developer will answer, provided the operator has used it sufficiently to know what he can do with it.

If we find a negative too dense or too harsh, it is only a question of how long an exposure to give. It is much more difficult to judge of the proper exposure for such a negative than it is for one of medium density; but by repeated trials and perseverance a good slide may be obtained. We find, however, that different brands of plates work very differently. Some are much quicker and work much flatter than others. The quicker plates are generally the best for dense negatives, and, after a little experience with different brands of plates, we often get better results by using one brand of plates for certain negatives and another brand for negatives of a different quality.

In case of an uneven negative with more or less halation, local reduction is very useful, either for making prints or slides. The Farmer reducer is very good, and the only knack in using it is to make it so weak that it will work slowly, and not run away from us. First test the strength of it on one edge of the negative, or a rejected negative, and if it works too fast reduce it with water; if too slow, add a little more of the potash. When of the desired strength apply it with a small brush to the thick spot on the dry negative, applying the most reducer to the thickest portions and shading off gradually, holding toward the light occasionally to watch the result; and all halation can be taken out, so that neither the halation nor any line of demarcation will show at all in a slide made from the negative so treated.

In many cases a portion of the negative may be covered a part of the time when exposing the slide plate, and thereby give more time to some portions of the negative than others, so as to produce an even slide. We may also develop portions of the slide locally for the same purpose, but the proper exposure is always preferable when possible.

After all the painstaking possible, some of the slides may not be quite right. If they are a little weak, they may be intensified with good results, and while various intensifiers give good results on negatives, there is nothing that equals the silver solution for intensifying slides.

Reduction, either local or throughout, may be often resorted to with good results. If we have good negatives to work from, it is perhaps better to always make a new slide; but slides made from poor negatives, and after several trials, may often be intensified or reduced with less trouble and with as good results as would be likely to follow making new slides.

When there is no particular reason for making a slide from a faulty negative, one may say they "can't" make a decent slide therefrom; but when we are to make a set of slides from whatever material may be at hand, we must first resolve that there is no such thing as "can't." Of course a negative must be sharp and have fair detail; if this is the case, we can make a fairly good slide from any kind of a negative.

HOW TO WRITE FOR A PHOTOGRAPHIC YEAR-BOOK.

By Gustine L. Hurd, Providence, R. I.

IT is said to be easier to tell fifty men what to do than be one of the fifty to do it. In its application to writing for a Photographic Annual, this is distinctly true—it is always a pleasure to point out a road for others to pursue. In what follows exception is made, of course, of those who have something to say and know how to say it. There are always some who have achieved so much more in certain directions than the most of us, that they can instruct to some purpose along the lines of their experience. When no such special attainments are present, and one has received an invitation to contribute an article, a few hints may be of the greatest service. Of course, one does not want to decline the glory of seeing the offspring of his brain in print. The poet Saxe says:

"It's pleasant too to see one's name in print
A book's a book if there is nothing in't."

There are a great many things that may serve as a basis for a dissertation. If one has chanced to go off for a day on a view-making campaign, a great opportunity is offered to indulge in a description of natural scenery. Henry James and Owen Meredith are not in it when these men with a tripod let themselves loose, and it forms very interesting reading to those who want to learn something about photography. It may chance that, after a display of fine writing has been made, we are instructed how to make a kit for a holder, by the aid of a blacksmith and a few pieces of tin, for some odd size of plates that by mistake have been taken along. Or one may have a wife and babies at home, and an extended dialogue in which all the members of the family participate, previous to, and on the subject of, the trip, can be set down with profit Or the old man may shy and throw out all the picture-making traps before you have fairly got out of the yard door. Then what more entertaining and valuable than to narrate the occurrence minutely. Perchance the bottle of whiskey, which was to have cheered and strengthened you till you should return to the bosom of your family, has been broken, in which case a full half page of good photographic reading can be indulged in, descriptive of your feelings. But if you remain all the working days of the year under your skylight, there is great chance for an article telling us how home-made apparatus can be produced at almost no cost, beating the dealer dead. Particularly is this the case in the matter of trays. This is a most alluring branch of such a theme. Do not fail to tell us just what kind of wood you used—whether it was part of an old shoe-box or not—and how many cents you paid a carpenter to fit it out for you, and whether you used paraffine or balsam of copavia to stop the joints. Such things cost high when you have to buy them, and no photographer's training is anything like complete till he has been instructed how to make trays. There are various other things that can be made at home—in fact, almost anything but lenses can be constructed by one's-self with only a broad ax, two gimlets and a saw; and things so produced are not only useful for the purpose for which they were intended, but serve as bric-a-brac to ornament your place as well. Surrounded by such appliances the impression is conveyed to your sitters that you are not *stuck up;* that you are not reveling in ill-gotten wealth, which has been a tax on their pocket-books; in short, that you are an example of that humility that belongs to the artistic temperament. Or you can write upon something involving chemical knowledge, in which case you want to be profuse in the use of such words as *gramme*, *kilometer*, *liter*, methylated spirits, and the like, because it imparts a twang of learning to your article and impresses the average reader with a becoming sense of your scientific attainments. If one has no predilection as to a topic, it may be mentioned that it is always in order to bewail the low estate of photography, financially—the wail should be well accentuated. Incidentally, you can narrate how you managed to hornswoggle your rival when he went into the ticket-selling scheme. This opens up a great field in the ethics of business, if you care to prolong the discussion. Such an article comes to a graceful conclusion by an apostrophe to "*our beautiful art.*"

If these random hints serve to brace up any ambitious brother, who is anxious to write and has nothing under heaven to write about, they will have served their purpose.

GAS-LIGHT PHOTOGRAPHY.

By Charles Richards Dodge, Washington, D. C.

THE production of a negative by gas-light exposure is not the mere novelty that may appear at the outset of the suggestion. In still-life compositions, a branch of photographic art that is whofully neglected, I have found that certain results may be readily secured by gas-illumination which are not attainable by daylight exposure without most painstaking and careful handling of the light. Gallery daylight is so diffused, as a rule, that much of the richness of contrast, in still-life composition, is lost. Or, if the light is more concentrated, the shadows are hard, and there is too much contrast. On the contrary, the light from several gas burners may be so arranged that it will fall where it is wanted to produce an artistic effect. For example, where it is possible, the shadows upon the background should be suggested rather than strongly defined. One or two lights may be arranged to cast the shadow, and another to give this shadow luminous quality. This treatment is particularly applicable to the photographing of flower studies, which are among the best subjects for gas-light photography.

Having arranged the subject, the first thing is to look for reflections and for strongly accentuated high lights—or, in some instances, double high lights, when more than one jet is used—as these may mar the picture. Cross shadows, from solid or angular objects, or heavy double shadows, are also to be avoided. The danger of reflections is greatest where the subject is an interior, as an artistically arranged "corner" of a room. Every picture-glass or mirror is liable to be a haunt for "ghosts," and the ghostly reflections must be looked for and eliminated, if present, before the exposure is made. One of my "corner" studies was once spoiled by the faint reflection cast upon a picture-glass from the chimney of an unlighted student lamp several feet away, and not in the subject.

With a Seed 26x plate and two 6-foot burners, an hour's exposure with the full opening, or even f/11, will make a perfect negative, which is developed with a normal developer. With five chandelier lights I have produced a strong negative after 30 minutes' exposure, the subject being a mantel covered with bric-a-brac, every detail in the delicate tracery of several pieces of French china, as well as the carved woodwork of the mantel, and the fabric of the drapery, being faithfully reproduced. In a little study called "Supper for Two" (no figures), an hour's exposure, with two gas jets ten feet distant, gave detail so clear that the label on an olive jar is as distinctly legible in the aristo print as on the label itself, though, of course, greatly reduced.

The special advantages of gas-light over daylight for still-life subjects, are clearness and at the same time softness, without strong contrast, giving a perfect printing negative. It stands to reason that the shadows in a dark corner, or under a table, will be deeper by gas-light than by daylight exposure, under the same conditions, and this portion of the negative may be pretty nearly transparent. But such deep shadows can be avoided, as the light in gas-light work can be directed where it can be used most effectively.

In the piece that I have called "After the Opera," recently shown at the Cosmos Club Exhibition in Washington [see illustration], two bracket gas-lights, 15 inches apart, were used, with a kerosene lamp between them on the same plane. The nearest light was perhaps

Negative by Chas. Richards Dodge.

AFTER THE OPERA.

three feet from the mass of daisies, and on the level of a point about two feet above them, while their position in relation to the background (of gray felt), was perhaps two and a-half feet forward of the perpendicular plane of the screen. The flowers were nearly a foot from the screen. By this arrangement the jet nearest the background threw its light in a degree behind the daisies, thus softening and breaking up the shadow masses made by the other jet and the oil lamp, by which means a highly artistic background was produced. I may state that the background was left a little out of focus. The black feather fan to the left of the vase was added to give depth to the center of the picture, a slight mistake, as the result proved, for there is entire loss of detail, leaving something to be explained, when with a less dark fan detail would have been suggested, and the same contrast produced. The lighting of the candle was left to the last moments of the exposure, the cap having been replaced in order to time the exposure of the candle flame and avoid halation. I should mention that after arranging the lights they should always be shaded, so as not to shine into the lens. This is easily accomplished in several ways. Lens used, a No. 3, Beck, rapid rectilinear.

One of my platinotypes of an outdoor subject, with a good deal of detail and sharp contrast, shown in the recent exhibition of the "Washington Camera club, of the C Bi C," was printed from a gas-light negative made from an aristo print, the original negative having been broken. It took its place with prints from some of my strongest and best negatives, no one surmising that it was a copy, and a gas-light copy at that.

I have yet to experiment with the copying of manuscripts by this method of illumination, but I am sure good results will be reached. There is nothing quite so trying as the attempt to print out the portion of a negative representing white paper that has been over-exposed in strong light, while other portions have had only normal exposure. The glaring effect of dead white in strong light is subdued or softened by gas-light, and a printing quality is secured which will give a sharp and legible reproduction of black against white, as in a manuscript subject. I have only experimented slightly with the copying of oil paintings by gas-light illumination, but success has attended my efforts in the two or three trials made.

As a concluding argument, the camera enthusiast, whose time is more or less occupied in the hours of daylight, will find pleasure and satisfaction in gas-light work, because it can be done in the evening when there are hours of leisure, and its results, under proper conditions, will always prove successful and satisfactory.

ASPHALTUM AND ETCHING.

By C. B. Talbot, Tacoma, Washington.

THE asphaltum process for etching on metals is one of the greatest beauty and excellence. While much has been added and taken therefrom, the substantial elements remain much as they did when put in use forty years ago. The fact that asphaltum, or a certain portion of it, is highly sensitive to light, was known before even the salts of silver were used. Crude asphaltum, of almost any variety, is separated into two parts by making it as fine as possible in a mortar, and then dissolving it in ether. The portion dissolved is poured off. No particular care is observed up to this point, but the powdery compound that will not dissolve, is carefully caught on a clean cloth filter. It soon becomes dry, and may be immediately dissolved in good benzine. The benzine is first deprived of any water it may contain by pouring it over and among some lumps of fresh lime; the asphaltum powder is now dissolved in it, and it is made of such a consistency, that when it is poured on a sheet of zinc, copper or steel, it will be of a light wine-color. Owing to the oily nature of the fluid it will want to gather into stripes and ridges, if not kept in gentle motion until it dries. The thicker or darker the fluid appears, the more troublesome it is to keep the coating even. A beginner will most likely get it too thick on the first trial, as he is apt to think that there is not enough of it. But it will etch well when the film is so thin as to be only well seen on the plate. The plate itself should be well cleaned with lye, and washed and dried before the coating is put on, or when the etching has proceeded a little the film will loosen and come off. When the etching is done in a battery (instead of acid), this is especially apt to occur. This may be well prevented by *heating* the plate, before the first and each subsequent etching. The heating is not more than just feels uncomfortably warm to the hand, and may be done over a common lamp, if the plate is less than six inches square; if larger then a regular hot plate of iron, on which the plate is laid when etching in a battery. The bath of sulphate of copper is the same as that used for making an electrotype, only that the plates are in opposite positions to that for electrotypy, on which the deposit is made. The cutting is more even than when done with acids and mordants, and can be controlled with the utmost nicety by separating the plates. There is some difficulty when the plates are suspended vertically, as the lower and upper portion of the bath act with

ENGRAVED BY ELECTRO-TINT ENGRAVING CO.

A STUDY

BY J. ED. ROSCH

differing energy, owing to the differing densities of the fluids, and the rising bubbles of gas which form little channels where they rise. This may be avoided by placing the plates horizontally, and separating them in any suitable way. The time will vary from 8 or 10 hours to a day or more, according to the depth and strength of the biting; stronger when they are near together, and speedier more feeble, and less vigorous when further apart, for fine lines, or *vice versa*, for coarser and stronger ones.

The first bath for etching with zinc is of nitric acid and water, about as strong as common vinegar, and during the first three bitings should not be made stronger if the lines are fine, or whether fine or not much of the clear perfection of the line depends on not forcing the etching too much at first, however the etching may be done. At the third or fourth biting we commence to use powdered resin or colophony, by dusting on with a fine soft brush—or laying the plate, face down, on a slab covered with the dust, after which the dust is heated until it just loses its dusty color, when the etching is commenced again, increasing the strength of the bath at each second etching, or as may be required. When the finest lines are cut deep enough they are covered with asphaltum, wax or resin solutions, while the wider and coarser ones are bitten deeper, requiring sometimes twenty or thirty bitings, and dusting with the powder as often as the metal is too much exposed.

The development of an exposed and fully printed plate is something as follows: When first coated they are set away for a day or two to harden and dry (if used too soon they sometimes stick to the negatives), and may then be laid away and used as required, keeping well for several months. The printing requires from a half to four hours in bright sunlight (printing in cloudy weather is uncertain). This fact has been the chief obstacle to the general use of this most perfect process. If the negative (reversed) is so strong as to prevent all light from coming through it except in the lines, they may be less carefully printed than if at all likely to let light through; if light gets through it will be impossible to get a good development. The asphaltum lines printed by the open places of the negative are only faintly seen when fully printed—more failures coming from under than over printing. Sometimes the printing may be done in bad weather by coating the plate with gelatine, or albumen sensitized with three per cent. solution of bichromate of potash solution. When dry the printing can be done in from six to twenty minutes, when it is (if gelatine) plunged in very hot water, when all the parts not acted on by light dissolve—exposing the coating of asphaltum.

This can also be done over a coating of common resin. The development may be now commenced by using a sponge and a lather of soap—first going all over the plate with care. Then with a tuft of cotton dipped in sweet oil, and a drop of turpentine (be careful to use little turpentine, or it may loosen even the image lines if too strong), worked by a kind of soft dabbing or patting motion, the asphaltum or resin will begin to loosen, and by keeping it patiently going the part unaffected by light will soon loosen and come off, leaving the hardened lines perfect and clear. The objection to using the gelatine is that the lines are a little coarser than when the asphaltum alone is used under the negative, and hence the work is not so smooth and perfect. No method of rolling up in ink, lithographically, ever produces the clear, perfect lines of the asphaltum alone, or renders such perfection of detail from a sharp, perfect negative.

With the heating of asphaltum, it becomes tarry or waxlike, and does not harden on cooling, if much overheated, and this must be avoided. Half-tone plates are etched most perfectly by the asphaltum process, and better and clearer than by any other—that is, if the negatives are dense and clear, by the wet plate process; though some slow gelatine process plates are successfully used—when sufficiently clear and dense. Some very fine negatives are made by hand, without the aid of the camera, by cutting through a light proof medium on glass. The drawing is done to appear as the resulting print is to be, *i. e.*, appearing as reversed negative would, and owing to this circumstance, the draughtsman, or really the engraver, is materially helped, as he works naturally—without reversing, as in all other engraving drawings; and as the lines are of the utmost sharpness, and of any strength from fine to coarse, according to the dry points used, it has much to commend it for all kinds of letter and fine line work. With a good ground and practice it is better than any kind of pen work for copying by the camera ever can be, as all pen drawings have to be kept well open between the lines, or the ink joins and spoils them when the wet lines are at all close together. But by this plan lines may be placed so closely as to be too close and fine for ordinary printing purposes, and the result has a peculiar brightness about it that no pen drawing can ever possess. The drawing is no more tedious than by the pen, and considering that there is no afterwork, and that they can be made as large as the largest plates of glass or celluloid, exceeding in size any camera made, there is another advantage. These negatives can also be worked upon at any time, and additions or alterations made without damaging the existing work—when new editions are required, being thus valuable for mapping and many purposes.

THE IMPORTANCE OF A GOOD JOURNAL.

By Henry Dietrich, New York.

"THE Pen is mightier than the Sword" is an old saying; and the intelligence of a people is shaped and reflected by its literary tendencies and pursuits. Without literature no intelligence! and what is said of a whole people, will also find its application to the single individual.

If we look at the immense number of political daily and weekly journals published in the United States, and the great number of subscribers and daily purchasers of these papers, we cannot help exclaiming: Is our country not the seat of intelligence? Who can beat us? True enough, we must admit these facts; but alas! the same cannot be said of our technical journals. Take, for instance, the profession in which we are mostly interested—photography. We have now a goodly number of Photographic Journals; every one has its more or less extended list of subscribers; they all try to make their journalistic enterprise a successful one. But is the number of subscribers really in proportion to the untold number of photographers who ply the camera, from the Rio Grande to the St. Lawrence River, from the Empire City of the East to the Golden Gate on the Pacific coast, to say nothing of the many amateurs and friends of the black art? Decidedly not, and it must be confessed that we meet frequently with a laxity and indifference to literary matters that is surprising. Employers as well as employees make the same feeble excuse: "We have no time." And do we not hear of this same class of people the constant, and almost stereotyped complaint: "Hard times, no business, we might as well close;" whereas their opponent, who runs a gallery a few blocks off, does a comparatively thriving business and is on the road to success? Why? because he reads the journals, seeks and finds useful information in them and digests the intellectual food offered to him. The result is evident.

Well do I remember the day the first number of *Anthony's Bulletin* was published, at that time one of the few journalistic pioneers of the period. And now? A whole regiment of them, enough to feed a million, but only a select number of readers to sit at the table and partake of the food.

And besides our semi-monthly and monthly journals, have we not our yearly Almanacs? Take, for instance, the *International Annual*. Is not every volume a standard work by itself? Articles written by the most eminent scientists and writers of both hemispheres fill the pages, and every branch of photography enhances its beauty.

Is it not to be regretted in the face of such facts, that so many lack sufficient interest, we might say intelligence, to comprehend the importance of reading and studying a good journal?

All of you take advice. Remember: "Experience begets wisdom!" Read and study the journals, and with the increase of intellectual power gained thereby, you will not only profit in that direction, but also financially.

A STUDY IN PATHOLOGY.

By Robert J. Hiller, M. R. C. S., L. R. C. P., Stratford, England.

THE comic journals frequently make merry over the troubles of the embryo photographer in a way that is at the same time both unfeeling and unseemly, and, I am sorry to say, even the photographic journals are occasionally not innocent of the same heartlessness. The photographic disease is by no means a thing to be made light of, as any one who has experienced it, will, I am sure, admit. Think for one moment of what takes place when one of these unfortunates is newly stricken with the photographic fever. Up to the time of onset he is sane, and innocent of the fearful intricacies of new developers, new papers, new plates, and new processes He knows not the joys of Amidol, the delights of Gelatino-Chloride paper, nor the ecstacies of tentative development. But one dire day a photographic friend (*sic*) shows him how easy it all is, and from that time onward his life becomes one many-colored mosaic of cameras, sheaths, films and all the bewildering details of modern photography. The disease is sudden in its onset, and the latent period intervening between the exposure to contagion and the development of the full-blown affection is usually as short as it is alarming. It is on its full development that the patient's greatest danger is reached. He seeks advice. He goes to the center of infection—viz., his photographic friend, and asks him where he can get a hand camera (the beginner almost always wants a hand camera). I suppose this is a merciful dispensation of Providence, who knows that he will get tired of spoiling plates with it, and give it all up long before the case is hopeless. The center of infection is delighted at being consulted, he says in an airy way, "Oh, get one of the photographic Annuals, and you will find all you want in the advertisements." If, now, the patient acts on this advice, he is almost hopelessly incurable, and will, in all probability, soon end his days in comfort in an asylum. We will suppose he gets the Annual, he looks up all the advertisements of hand cameras, and determines to get the one which he finds to be the best recommended, and what does he find? Every one of them is either "the simplest and best," or "the cheapest yet issued," or "the most perfect it is possible to buy," or else "is quite unapproached" (the latter is quite likely). By this time he is probably in a maniacal condition, and is caught an easy prey by the first unscrupulous dealer he consults, who probably palms off a useless instrument on him. However, having obtained his camera, he thinks he is safe; he has only to select the brand of plates he will use and then go to work. But here, again, the same difficulty meets him. He naturally wants quick plates, he has learnt enough to know that; so he looks out for some in the Annual, and is absolutely astounded to find that every rapid plate made is either "the quickest plate ever made," or else a quicker one still. He returns to the dealer and buys the first he thinks of, which probably turns out to be totally unsuited for the work he does; and so does this wretched seeker after the truth battle on (if he still possesses the enthusiasm), until at last he produces something more like a negative than a piece of plain glass or a scrap of opaque paper, and less like a decent photograph than a so-called naturalistic one. He has the same trouble with his printing. All the papers again are either "the Best," or else "Superior to all others." If he should still possess the enthusiasm to triumph over all these difficulties, and to produce some pictures that ought not always to be kept out of sight, he will probably recover, and may possibly earn credit by his subsequent productions.

EVOLUTION AND ADAPTATION.

By Alvey A. Adee, Washington, D. C.

IN the gradual evolution of the camera and its accessories, a sound tendency toward fewer detachable parts is seen, and it is to be hoped that progress in this helpful direction may not be arrested. Many of us, not yet altogether old, may recall with pangs of retrospection the early camera, in which almost every detail was loose, so that the assemblage of the whole in the field became a severe tax on time and memory. I have yet on my shelf a primitive book of instruction, from which I derived my preliminary training in the art photographic, in which the touching injunction occurs to remove the ground-glass screen and lay it down, "being careful not to step on it!" The hinged screen came as a remedial improvement, to be succeeded shortly after by the excellent parallel toggle-movement now so general. The detachable tripod-head unfortunately still survives, but those who have used the rotating table-head set in the base of the camera, are not likely to revert to the old device. Indeed, a well made box of the modern type is now so completely "self-contained," to borrow a fit word from the canny Scot, that one seldom has to trudge wearily back to some distant dell or craggy cliff to recover a forgotten accessory.

Another of the old worries is fast disappearing, in that the Waterhouse diaphragms in a separate case are giving place to the iris. But the lens-cap is yet with us, until it tumbles into a brook or trundles gayly over the lee scuppers in mid-ocean. If fitted tightly enough to stick, the camera is almost inevitably jarred by its removal; if loose enough for easy uncapping, it is very apt to disappear while shifting the apparatus from one point of view to another—and hanging a straw hat over the face of the objective is not a satisfactory substitute, as one learns by experience. A compact shutter contained in the lens-tube, and giving either snap or time exposures at will, is well-nigh an imperative necessity.

The folding camera is a stride in the right direction, and in time, when the present craze of the makers for lightness gives way to common sense, and strong, light-tight plate-holders are supplied, fitting securely to the bellows-frame so as to guard against side-leakage, our folders may be useful for all-around work. Sad tales reach me, from many quarters, of befogged plates, warped holders, and even holders that come to pieces in our dry American air, when the glue that sticks them together comes unstuck. How many of our latest feather-weight plate-holders, when charged with No. 26 plates or films, will bear a minute's accidental exposure to the sun-light? I used to be able to lay my old Anthonys or Blairs on a red-hot rock until I got ready to shove them into place, and feel no uneasiness in so doing. But now I have an uncomfortable sense of unsafety in the open unless the box be swathed in its focusing cloth, as if it had the toothache, while holders must be shifted and slides drawn under friendly cover of darkness and enshrouding folds of black cloth. Light-tightness at every stage of preparation and exposure is indispensable, and is readily attainable by a little mechanical adaptation, even at the expense of a few ounces in weight. The perfect camera should be capable of working unprotected in the full sun-glare without a suspicion of fog. I am aweary of swaddling my Detectives and Holders in wrappings like an Esquimaux baby for a five minutes' encounter with the sunshine.

Still another phase of soul-weariness attends the necessity of changing lenses to suit the varying conditions of view. One must have at least two objectives at hand in a summer-day outing—a rapid rectilinear and a wide angle. A "telephoto" is fast becoming equally necessary. The consciousness of being ready for any emergency of distance or wideness of field is marred by the nuisance of unscrewing and screwing in the several glasses. Our English brothers have some ingenious appliances to meet this difficulty, such as universal bayonet joints, and latterly an admirable plan (I would tell the name of its maker if I were in the habit of advertising tradesmen gratis) by which the thread bites without "crossing," and screws home at the first trial. But these betterments avail nought to prevent the mishap that once befell a friend of mine who, being of a nervous temperament, and in a grievous hurry withal, in changing lenses at a critical moment on a high river bank-side, beheld his cherished Jena aplanat rush violently down a steep place and perish in the waters.

We amateurs can never write about our pet hobby without throwing out a suggestion or two for the makers of apparatus to ignore with their accustomed placidity and indifference to the cardinal law of demand and supply, to which I think trade ought to be more sensitive. This is my present suggestion: Adopt a device which shall serve the same purpose on the face of the camera, that the double or triple nose-piece does at the end of a microscope tube. The microscopist simply can't get along without his nose-piece, for by its aid he can instantly change the power employed. The general view-taker would, I am sure, welcome some such contrivance on his camera, whereby he could, by merely rotating his front-board, exchange his long-range rapid-rectilinear for a six-inch wide-angle.

Whatever may be the fate of this friendly hint, it is at least in the direction of the proposition with which I started out—that camera-makers should altogether wean themselves from the old weakness for complex detachable parts and accessories and give us instruments that we will not be apt to scatter over the country-side, in sections and fragments, during our too limited summer holidays.

PHOTOGRAPHY IN ART AND EDUCATION.

By F. P. Valerino, Editor La Revista Cientifica Hispano-Americana.

NOT so many years ago photography was practiced by only a very limited number. It was in its infancy, crude and rough were the results then produced. There was lacking knowledge which necessitated time, brains and untiring patient effort. Disappointments were encountered by the savants who undertook to wrest from nature the materials and methods that would lend themselves to the obtaining of looked for results; these disappointments were but incentives, not only to them, but to others, to continue in the struggle. For several years, formulas, processes and methods underwent a slow transformation. Apparatus was changed to meet requirements and photography became possible to all; cumbersome apparatus was replaced by light, compact portable instruments; time of exposure reduced to a minimum, and uncertain methods replaced by simple accurate processes, all by the patient labors of painstaking lovers of the art.

Master minds have worked at the solution of the various problems, and used their faculties and energies to place photography on such a pedestal, that to-day the world acknowledges it as one of the most useful and indispensable discoveries of this the century of progress. Old pioneers in photography have passed away, but they have left a rich legacy to younger heads, who, fired by ambition and love for their art, are ready to undertake the work of still further advancing photographic knowledge, surprising even themselves with the wonder of their discoveries. Photography has soared to heights absolutely undreamed of by its early devotees. It has attained this eminence, not to retrograde, but to advance further and further, receiving as heirlooms rich jewels from the minds of eminent scholars, whose disciples will add to their luster by taking up the work where their tutors laid it down.

It is not our purpose to enter into any exhaustive discussion, but to glance over the possibilities of photography. We have said that photography has been justly accorded a high position in the artistic, scientific, and commercial world. The beautiful always attracts and inspires lofty thoughts in the mind of man. The awe inspiring works that beneficent nature has so bounteously spread before him, must inspire him to do work in its way as grand and lofty. An appreciation of nature's gifts is life to a man. That power for appreciation, which is power for receiving inspiration, is cultivated and fostered by photography. The inspiring monument of nature may not impress him instantaneously, but the embryo may be there, and, fostered by the photograph and by an enlarged vision, may blossom into life.

Photography is an art by which man can with ease descend into the bowels of the earth, visit its darkest recesses, and wrest, as it were, from nature her jealously guarded secrets. Photography and progress are twin sisters. Yet in its youth, wonders have been achieved, and the possibilities are illimitable. In the line of reproduction for illustrative purposes, photography is without a rival. As a recorder of events, photography is exact, is truthful. In commerce, photography is now indispensable. The merchant, the real estate agent—in fact, in every walk of life its value is recognized.

Every one interesting himself in humanity concedes that to prevent vice and crime, the surest factor is education. It is with inexpressible pleasure that we, who have studied this problem, note that education is now compulsory, that what, a few years ago, was a finished course is now a preliminary one. Man is to a large extent a child of circumstances, but in what except education can we find that which will enable him to trample under degrading influences? The mind, cultivated by study and a keen perception of the beauties of nature will necessarily reject anything tending to degradation. There is no doubt but that photography is recognized as a great educating medium. The number of its votaries is legion, schools of photography are springing up, and parents are fostering in their children the desire to pursue the study of nature by the aid of the camera. As a factor in education photography has no equal. Apart from the advantages derived from actual practice with the camera, its necessity for photo-reproduction places it in the front rank of educational means. When its advantages are so palpable, its necessity so well recognized, when on every hand in every profession, we see photography employed, we are tempted to ask why our youth are left to struggle over exposure and development, and why those in authority do not by careful judicious training in the schools, guide them in their early efforts that they may enter on life better equipped for the struggle. Instruction in photography and in elementary science should be part of the educational routine. In England, science is taught in the public schools with excellent effect on the habits and future of the children. Carry on the work by providing the coming generation with a proper knowledge of photography, an art science with which they come into contact at every step.

THE ART VALUE OF PHOTOGRAPHY.

By W. D. Goodwin, Putnam, Conn.

MUCH has been written upon the science of photography. As an art its uses are less distinctly understood. Many claim that the photograph is never a work of art. It is too mechanical—too realistic. Others refute this claim by showing the beautifully artistic effects of which it is capable under their skillful management.

No attempt is here made to put the camera upon an equality with the brush or the crayon as an instrument in the artist's hands. It is less directly under his control, and so less readily enables him to put his personality into his work. But it is the purpose of this article to show that there may be a distinct art value in this new method of picture-making, and briefly to suggest wherein it lies.

It may be said that it takes an artist to paint a picture, while any one with proper acquaintance with the mechanical processes involved can make a good photograph. In order, however, to judge of the artistic merits of the photograph, it is necessary to apply to it the same criterion as to other branches of art.

Negatively considered, accuracy of representation does not constitute a work of art. The pictures of certain old Italian masters are said to contain mistakes in drawing that almost any modern schoolboy could correct; yet, as works of art, they hold a permanent place. Without doubt, it would have added to their charms, had the errors been avoided. But the essential artistic quality lies in something deeper than the form. The figure of a common potato, for example, as seen in an ordinary seed catalogue, would hardly be called artistic, however perfect its form. But in a different setting, where in connection with other objects it may help to show something of man's relation to nature, even such a commonplace vegetable may have a real artistic use, though there is no attempt at accuracy of drawing. Who thinks of criticising the potato-eyes in Millet's deservedly famous picture "The Angelus"?

Photography focuses nature, and imitates her forms exactly. But this alone does not give art. The material certainly is here. Nature furnishes both model and canvas. Yes, more, for she is ready even to do the painting herself. One thing only is lacking—the artist's mind to guide the whole operation. Given that, the possibilities of photography have scarcely been dreamed of. Art without an artist? No. The artist first is needed, and then every possible tool with which nature can supply him. Of such tools the camera must be recognized as by no means the least useful.

To the artist's eyes nature is symbolic. She brings him a message which he is able to read. Then he wants to convey a part of the same message to his fellow-men. He may do it in nature's language. She furnishes him the alphabet. It is for him to frame the words and sentences, and give expression to his thought. Thus he puts his personality into his work.

The expression of himself is thus the one purpose of the artist, as it is of every great thinker. The medium of the expression is in each case the one best adapted to the power of the individual. One finds music the most suitable medium; another literature; others architecture, sculpture and painting. These last three form a group of arts appealing to the eye rather than to the other senses. To this group photography seeks admission. Is it worthy of so high a place? Just in so far as it can serve as a means for the self-revelation of the human mind. This is the standpoint, and this alone, from which to judge of the art value of photography.

How may the camera be made to perform such service? Different ways will suggest themselves to the thoughtful mind of each earnest photographer. By a careful choice of view, a skillful management of light and shade, a tasteful arrangement of draperies and other accessories, the artist can make the picture tell whatever story, or express whatever thought or feeling lies in his own mind. He uses the camera not simply to produce a likeness of nature, but to transfer to the negative his thought about nature.

This is the proper field for the amateur photographer. Restrained by no business limitations, he is able, after mastering whatever technical detail may be necessary, to give his unreserved energy to the art side of his chosen avocation for the mere love of it. Let him not be too easily satisfied. Let his ideal be very high. And if attainment falls short of the ideal, let him remember the poet Browning's deep saying:

> "Ah! But a man's reach should exceed his grasp,
> Or what's a heaven for?"

AMATEUR PHOTOGRAPHIC SOCIETIES.

By Walter Sprange.

LIKE the typical "Jack Tar" I have a sweetheart at either end of my annual trans-Atlantic voyage, each of whom has charms peculiar to herself; and although one is the parent of the other, I must admit that the mother, having so many virtues, which have only been enhanced by the work of time, and her own naive manner of retaining her youthful simplicity—completely captures my susceptible heart, for the time being, each year I visit her; so that it is always with feelings of much regret that I sail away to revisit the daughter, and while this confession may seem rather disloyal to the latter, I find I am even more warm in my admiration of *her* freshness, youth and vigor, on my return after an absence of a few months.

Being a member of a postal photographic club in England, I have just been passing an hour in examining the work of my fellow-members, all of whom are evidently rivals in their admiration of my dear old sweetheart; for they have many views of her, and most of them seem to take a delight in depicting her most ancient parts. No doubt the dear old soul has a past history which it may not be wel to inquire into too closely, for at one stage of her earlier existence she carried things with a "high hand," and was very vindictive in her treatment of those who had lost favor; but she retains and guards jealously many relics of the past, which must now be considered interesting more on account of their beauty and antiquity than of their historical reminiscences.

There is a restful atmosphere of quiet, peace and softness throughout England, which is in strong contrast with almost all other countries, and which is really her peculiar charm, intensified by the reluctance with which she displaces or makes any alterations in her appearance. Not long since I visited Hampstead Heath, a public open space in London, which I had not seen since boyhood's days; to my surprise I found it absolutely unchanged. This must be one strong reason why Englishmen delight in settling down in the old country after years of absence.

The grandeur of the vast improvements being accomplished in the laying out of Greater London by the County Council (which has the work in its hands), cannot be fully appreciated by those who have not a fair knowledge of the dirt, squalor and narrow streets of old London, which are now fast disappearing, while—at the same time—every little open nook and corner is jealously retained, brought to view by the demolition of surrounding buildings, and brightened with verdure.

But, I fear my younger sweetheart will lose patience with me if I continue in this strain any longer, so I will pen the thought in mind, which prompted me to accept your invitation to contribute—it is a plea for the local organization of amateurs in America in every place of sufficient size; it creates a greater interest in the work, gives a much better opportunity for exchange of ideas, and affords much better facilities for the careful worker to manipulate, with every convenience at his disposal at a moderate expense. In England alone during the past year *nearly one hundred* new societies have been formed by amateurs; a large percentage of them are the outgrowth of scientific and educational institutions, which shows that photography has not alone become a pastime for the leisure class, but also a study—and perhaps recreation—for persons of studious inclinations. I have a very strong conviction, however, that almost every educational and scientific institution of any importance in the States will have a photographic section within a few years, and that both the scientific and the artistic features of photography will reach stages which are not yet fully appreciated.

I am disposed to think that much of the increase in the number of societies in England during the past year, is due to the work of the "practical demonstrators" engaged by the leading manufacturers of various specialties in the photographic line, and cannot too strongly indorse this plan of attracting attention to the various advances being made so rapidly by the different promoters, and of giving practical illustrations of the methods of manipulating them; it is an essential and valuable feature which should be cordially indorsed by existing societies, and which should be the means of creating many new ones, if adopted in America more universally by the large and enterprising establishments which lead in the work of progress.

MÉLANGE.

By Raymond Lee Newcomb, Salem, Mass.

TWELVE years ago a gentleman came out of a dark-room far north of the arctic circle, and holding up a negative not fully dry, said, "How is that?" 'Twas a $6\frac{1}{2}$ x $8\frac{1}{2}$ of the first two polar bears captured by the Jeannette Arctic Expedition. Dear me! how time passes. The noble fellow (Jerome J. Collins) who held up that negative for my inspection, has crossed over the great divide. His final demise on the shores of the Lena River is a matter of history. All through Siberia, 5,000 miles, and Russia, nearly 3,000 more, I longed for a camera. Had I then possessed one, how much I should have to enjoy and profit by the rest of my life. I own now a kodak, and a $6\frac{1}{2}$ x $8\frac{1}{2}$ Blair box, with these I passed many happy hours. They almost speak—yet have their faults. The kodak is the folding 5x7 model of 1893. The view finder (I am obliged at present to use one), is too diminutive in the field of it, and interferes with quick glances at the same by this very reason. Then the frame, or box, will spring in carrying by the cover-straps, so that the cover will uncatch and bring a sharp strain on the cover-support and hinges. This may be my fault, but a catch to fasten more securely, with or without a key, might be arranged. I have seen two of these cameras act thus. The Bausch and Lomb lenses and iris shutters operate finely, the lenses cutting beautifully when required. So, too, will some even cheaper ones, and I have sometimes been puzzled to detect the difference, when viewing results. I believe others must have been in like frames of mind. The B. and L. shutters operate nicely and wear well, although to avoid over-exposure in land or seascapes, perhaps the focal plane shutter might be a good one. Concerning this over-exposure of distances, possibly the non-halation Seed 26 x or other similarly made plates help one out. I have thought so, and so, too, will slow development. Just now metol (Hauffs) is giving me nice results. It is used with sulphite of soda to start the plates, and then, after details are out to suit, add carb. of potass for density, and use it in quantities from ¼ of an ounce to an ounce according as the density increases. Pyro does good work but soils my hands; so did metol last autumn, but now as used it works beautifully. A formula which I like is metol 50 grains, sulphite of soda 1 ounce to 10 of water. Filter when fully dissolved. In another bottle put 1 ounce carbonate of potass and add 10 ounces of water. Label each bottle plainly. Mark every package and bottle used in photography, and keep notes of each and every exposure. It is tiresome, but *systematic*, and *it pays*. Mr. Carbutt has kindly sent me some of his tabloids. I expect much from them, and have distributed some to friends.

For a fixer I am trying that S. P. C. preparation. It works beautifully, but I keep Carbutt's acid bath near by as a "back log." About plates—manufacturers should cut to a more uniform size. I have found some to vary enough to fall out when the slide is drawn. The thickness and blemishes in the glass need sharp watching. Of course plate makers have many perplexities and try hard to please. I know I have charged faults to plates and *blessed* the makers, which as often belonged to me, yet we must get nearer to those beautiful images reflected so superbly on the ground-glass, and in the full color of nature, much nearer than at present, before either maker or user is satisfied. With all respect for the profession, it is yet for the amateurs to investigate and experiment because theirs is a labor of love, not profit, and the results are not measured by the dollars coming in, though frequently interrupted by the want of them with which to buy more "fixins." By the way, speaking of papers, I have seen

B. P. Red label, Solio, and Kloro all worked through the same combined bath and at the same time, and with excellent results; but for hot weather the platinotype process works well. It is so simple, and a hot burnisher is unnecessary. Pictures made and finished completely in 15 minutes, and a year old, are all right to-day. The one inclosed is a 15 minute job. This I know is contrary to the directions.

"You press the button," etc., may do for some, but I claim that to know the *how of it*, one should go through the whole process, including mounting, where room for much expression exists. Were I to go North again, a roll of film would doubtless answer best for obvious reasons, but here at home I enjoy plates the most. I love the sports

FROM PHOTOGRAPH BY R. L. NEWCOMB.

afield too, and when the glorious October days are here, when hill side and valley, maple, and birch, show the glorious tints of the New England autumn, then with "Parker," and kodak, wife and I will hie away to scenes where the true-nosed setters stand in cataleptic trances, something like the view herewith presented.

This is a Willis and Clements cold process platinotype. It was taken in the afternoon of a bright day, kodak held in the hands. Distance 10 feet. Seed 26 x plate. Stop f/16 and exposure $\frac{1}{25}$ of a second. The dogs were pointing queil.

You very kindly invited me to contribute a squib for the Annual. For a tyro it strikes me I have written all too much, and will close by saying to brother and sister amateurs—*aim high*, and thus show photography to be not only true art, but a faithful delineator of nature and the beautiful.

HARMONY.

By Edward Manser, Peekskill, N. Y.

AMONG the politicians of all parties the question of harmony is a very important one, and one which they are always very anxious to settle before entering into a campaign with any hope of success.

To the photographic profession the matter of harmony is also decidedly important, and must enter into the thoughts and detail of every part of the work. So much depends upon the relation of the various parts of a picture to each other, that too much attention cannot be paid to the harmony of the whole. Backgrounds are a very prolific source of discord, and will often cause a jarring note in an otherwise perfect picture.

Carelessness in the selections of an accessory will often spoil an effective pose.

Every true artist in the profession will be glad to observe that the old style scenic background is falling into disuse, and public taste is demanding something more artistic and more in keeping with the spirit of portraiture. People have become aware of the fact that if they want a photograph of woods and fields, it is better to have it direct from nature, and not to have it painted on a canvas screen and placed behind them when they are trying to look pleasant. Backgrounds and accessories should be subordinate to the subject and should only be used to bring out the strong points of the central figure. The scenic painters of to-day recognize this fact, and they are furnishing delicate and dainty conceptions for use in studio work. Seldom, if ever, should there be any decided or strongly defined lines in a background used for portrait studies. Anything that impresses the beholder before the central fact of the picture has fixed itself upon his mind is out of harmony, and strikes a false note.

Just here is where the art, the knowledge, and the experience of the operator should be exercised to the fullest extent. Every accessory should be made to take its proper place, and not allowed to intrude upon the territory of the main object to be portrayed.

Every right-minded person will concede that the background should be in harmony with the subject. The spectacle of an infant of tender years, arrayed in the light, airy costume of nature, seated upon a rock, surrounded by a landscape consisting chiefly of water, stones and tree-trunks, is enough to send a chill down the spinal cord of an Arctic explorer. And yet this is a thing you will frequently see in photography.

NEGATIVE BY C. E. VON SOTHEN ENGRAVED BY N. Y. ENGRAVING AND PRINTING CO.

EXPLOSION OF BUOYANT TORPEDO

CHARGE, 150 LBS. MORTAR POWDER
SUBMERGENCE, 5.5 FEET
HEIGHT OF JET, 174 FEET

EXPOSURE, 1-50TH SECOND
LENS, DALL. R. R. F/32
DEVELOPER, EIKO & HYDRO

Operators should at least aim to give the innocent and unoffending youngsters something warm to sit upon, and should try to make the draperies as suggestive of comfort as possible. Again, we have often seen the above mentioned traveler, wrapped in the furry folds of garments endurable only in Polar regions, sitting unconcernedly in a cozy chair with all the elements of warmth and comfort about him. It almost makes you melt to look at him.

It is just this habit of trying to mix incongruous things, indulged in by the careless operator, that has helped to forward the work of reform in background painting. That the fraternity was ready for the beginning of this reform, is evidenced by the manner in which it has adapted itself to the new order of things, and placed before the public such beautiful and harmonious specimens of composition.

The continuous ground is a very long step in the right direction. By its use the operator has been able to produce portraits that could not be attempted with the old style ground, and the figure can be posed to so much greater advantage that it is certain to come into universal use. This department of background and accessory should not be allowed to fall back in the onward march of photography, but should keep its place well up in the front line of progress, for in the future much will depend upon the use made by the operator of these helps to high-class portraiture.

THE PHOTOGRAPHIC PROPERTIES OF THE COMPOUNDS OF MOLYBDENUM, TUNGSTEN AND CHROMIUM.

By Gaston Henri Nievenglowski, Paris, France.

As the properties of molybdenum and of tungsten resemble somewhat those of the iron group, such as chromium, iron, nickel and cobalt, it was thought probable that their compounds would undergo some modification under the influence of light. Our experiments have confirmed this surmise.

To make the matter more clear, the compounds of these metals being but little known, we must bear in mind that their principal oxides are:

The binoxides, $Mo\ O_2$ and $Tu\ O_2$ (brown oxides).

The trioxides, $Mo\ O_3$ and $Tu\ O_3$ or molybdic and tungstic anhydrides, analogues to chromic anhydride, $Cr\ O_3$ (improperly called in commerce molybdic and tungstic acids), to which are related the hydrates $Mo\ H_2\ O_4$ and $Tu\ H_2\ O_4$, these being the real molybdic and tungstic acids. These acids give with bases, molybdates and tungstates analogous to the chromates. Besides these normal salts, there are others of a more complex character, the polymolybdates and the polytungstates, corresponding to the polychromates.

A blue oxide, $Mo_2 O_3$.

The blue oxides, $Mo_2 O_5$ and $Tu_2 O_5$.

Molybdic anhydride, $Mo O_3$, which is a white powder, soft to the touch, turns green under the action of light, in the presence of organic matter. The same effect is apparent if a solution of molybdic acid, obtained by decomposing barium molybdate with the necessary quantity of sulphuric acid, is used.

If a sheet of sized paper is floated on a five per cent. solution of commercial ammonium molybdate, which is a heptamolybdate of formula $Mo_7 O_{24} (N H_4)_6 + 4 H_2 O$, and is dried in the dark, it assumes a slightly greenish tint due to a beginning of the reduction. Exposure now under a negative gives a beautiful blue image, composed, according to analysis, of a mixture of the oxides $Mo_2 O_5$ and $Mo_2 O_3$.

If to this same solution of ammonium molybdate, hydrochloric acid is added, a precipitate of molybdic hydrate corresponding to the anhydride $Mo O_3$ is formed, which is redissolved in an excess of the acid. A sheet of sized paper floated on this solution and dried in the dark, gives an image similar to that obtained with the non-acidulated solution, but the paper is much less sensitive.

The same results are obtained with a sheet of ordinary paper impregnated with these solutions, and with a piece of cotton fabric that has been similarly treated.

Tungstic anhydride, $Tu O_3$ (the tungstic acid of commerce), which is a yellow powder while cold, becomes green if exposed to light in contact with organic matter.

When hydrochloric acid is added to a solution of an alkaline tungstate, a white gelatinous precipitate is formed, which rapidly turns yellow, and is nothing else but a hydrate, $Tu H_2 O_4, H_2 O$. On the addition of the acid in excess this hydrate redissolves, and paper or fabric impregnated with this solution become blue on exposure to light, and will give blue prints if exposed beneath a negative. The sensitiveness, however, is less than with the molybdates.

But, in this case, contrary to what takes place with the molybdates, the color disappears in the dark, the reduced compound becoming re-oxidized. This is a phenomenon not altogether unusual. We know, as a fact, that a solution of ferric sulphate, reduced to the ferrous state by the action of light, reoxidizes in the dark, returning to its original ferric state. We know also that silver chloride, in a sealed tube, exposed to light assumes a violet tint, due to the liberation of metallic silver, but whitens again in the dark by the recombining of that silver with the chlorine. However, in some cases in which we have not been able to be exact, the blue has become faint, but not entirely disappeared.

Crystals of alkaline metatungstate, such as sodium metatungstate, $Tu_4 O_{13} Na_2 + 10 H_2 O$, obtained by boiling a solution of the neutral tungstate, $Tu O_4 Na_2 + 2 H_2 O$, in the presence of metallic tungsten, until it ceases to precipitate on the addition of hydrochloric acid, becomes green in the presence of organic matter on exposure to light. Paper and cotton fabric immersed in a solution of sodium metatungstate, acidulated with hydrochloric acid, become, under the action of light, of a violet tint, and will, if exposed beneath a negative, give images; they are, however, much less sensitive than if treated with the solutions previously described.

This action of light on the compounds of tungsten was indicated last year by M. Schoen, in a communication to the Société Industrielle de Mulhouse, but the communication was not very lucid. He said: "Sodium metatungstate, obtained by the addition of hydrochloric acid to the neutral tungstate is affected by the sun's rays." (*Revue de Chimie Industrielle*, Vol. IV., No. 48. Paris, December 15, 1893.) We have seen that metatungstate is not so obtained, and that the addition of hydrochloric acid to a solution of the neutral tungstate would give us tungstic hydrate.

M. Villain, secretary of the Societé d'Etudes Photographiques, repeated Schoen's experiments and endeavored to strengthen the images. He has exhibited to the said society photographs on paper prepared with tungsten compounds.

We have been able to obtain similar results with the chromium salts. The procedure is this: A sheet of gelatine sized paper is floated for a few minutes on a solution of potassium polychromate (well known to photographers under the name of potassium bichromate, $K_2 Cr_2 O_7$) to which hydrochloric acid has been added, and is dried in darkness. Such paper exposed under a negative rapidly gives a blue image, being also much more sensitive than the preceding preparations.

The nature of the changes brought about by the light is not easy to determine, the analysis of the compounds being a delicate matter, especially in the presence of organic material. They resemble, however, the reductions that are produced when a zinc plate is plunged into solutions of molybdates, tungstates, metatungstates or alkaline chromates, with the addition of hydrochloric acid. It appears certain that, in accordance with the few analyses made, the compound which is reduced is none other than the molybdic, tungstic, metatungstic or chromic hydrate which exists in excess in the polymolybdates, or which is set free by the action of hydrochloric acid on the solutions of molybdate, tungstate, metatungstate or chromate. The oxygen arising from the reduction combines with the organic matter, gelatinized paper or fabric, which supports the sensitive salts.

It remains now to fix these images which are soluble in water. We have not endeavored to do this, and if we publish this work thus incomplete, it is with the hope that these indications will serve as an incentive to further researches, which we at the present moment have not the time to pursue.

CROSS LINE SCREENS FOR RECORDING LOCATION FORM AND SIZE, BY PHOTOGRAPHY.

By O. G. Mason, Bellevue Hospital, N. Y.

THAT photography is a progressive art-science is demonstrated each year by advances made in its application to new uses, and improved methods; from the empiricism of early days, it is fast becoming one of the exact sciences in many of its methods, a demonstrator of facts which are not within reach by any other known means. It furnishes a record as to the reliability of which there can be no question. A mere statement of words is far less convincing than a demonstration through the universal language of the eye. Size, form and location photographically illustrated are more easily and fully understood than is possible through any amount of verbal description alone.

In my own special department of photographic work, many practical demonstrations have fully established its value for measurement and comparison.

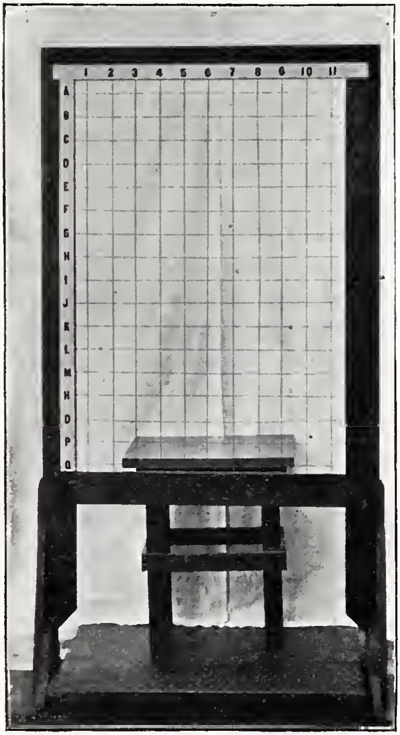
For the graphic recording of conditions, and as an aid in consultation, the apparatus shown in the accompanying illustration was constructed, and it has been found in practice to admirably answer the purpose for which it was designed.

But few words are required to make its use understood. The photograph of any object placed behind such a cross-lined screen is divided into squares, so numbered and lettered that they may be readily read and pointed out. Increase or decrease in size, change in form or location or outline, in inhalation or exhalation, are so recorded that they may be easily understood.

With the aid of a series of photographs made at various periods in the progress or treatment of disease, parties at a distance may be informed or consulted with much less labor and greater satisfaction and less uncertainty than is possible by description alone.

When the *eye sees* a deformity, lack of symmetry, or any outward abnormal condition, the mind far more readily grasps the how and why.

Cross screens having various sizes of squares—as may be suitable



for the work in hand—are hung in the light gallows frame shown with the largest or highest screen here illustrated.

The scales are on thin rods of wood, easily detachable for application to various screens.

The large screen for full length figures has squares of two inches. The smaller screen, for head and chest work, and the illustration of deformed children, has squares of two and one-half inches. The gallows frame in which the screens are hung when in use, is so knotted and screwed together that it may be taken apart without the use of tools, when required for transportation, or packing away to economize space.

THE CAMERA AND THE LOVER OF NATURE.

By F. E. Fairbanks, Fitchburg, Mass.

THE love of nature and of the beauties of natural scenery is instinctive in most of us. That is, there are but few who are not to a greater or less degree influenced by their charms.

That all are not equally susceptible may arise from many different causes, one of the principal being the lack of conscious observation, or of education of the perceptive faculty.

A beautiful musical composition may please a large audience collectively, yet no one doubts that the musical training of some portion of that audience will render their appreciation and enjoyment of the performance much keener, and that the lack of such training and study means a real, though unappreciated, loss to the less musically well-informed portion. The same may be said of pictorial art.

An artist sees and appreciates beauties that a person untrained in art is blind to, and this training in music and art is simply the result of observation put into practice, and made perfect by repetition.

Now the same thing holds good in our appreciation of natural beauty. A careless glance, while it may give pleasure, does not reveal the beauty of the scene before us. Careful study repays tenfold. When we approach nature, seeking for beauty, we are amazed at the reward that she spreads before us. Familiar scenes take on new beauties, and we wonder that our eyes have been closed to them so long.

Anything which will awaken this faculty of seeing the beauty all around us, is worthy of attention.

To many, the camera has proved the companion that has led them out, and, little by little, awakened an appreciation of the beauties of nature which surround us. One does not need to work long with a camera to learn that a scene may look much more beautiful from one point of view than from another, perhaps only a few feet away; also that a scene of rarest beauty viewed by the light of early morning, may lose much of its attractiveness when viewed under the afternoon sun, or *vice versa*. The camerist is taught to observe, to search for the most favorable times and conditions for work, and must grow more appreciative of natural beauties and scenery.

We are led to seek out new scenes, and to become more familiar with near-by attractions, and must add much to our capacity for enjoyment. To the lover of nature it seems needless to mention the satisfaction resulting from the camera's companionship, apart from its educational capacity. The walk, or drive, or perhaps the camping party, and the delightful outing among the mountains or by the sea, are brought back afresh in later years by the photographic record.

I could go on giving reason after reason for the benefit, to our minds and bodies, of closer study and observation of nature, and the help that the camera gives thereto, but enough has already been said to indicate what it may do. If you have not a camera, get one.

ARTISTIC PHOTOGRAPHY.

By F. C. de Sumichrast, Cambridge, Mass.

THE *art* of photography has seriously suffered from the constantly increasing facility of the process. Thousands of people buy hand cameras, and snap them at anything and everything, producing abominations by the gross. They have not the faintest idea of what constitutes a picture: they suppose that all the prints they complacently exhibit *are* pictures in very truth. The only useful purpose served by these Philistines is to keep manufacturers and dealers busy.

Along with them the professional "viewer"—as the taker of landscapes and buildings for commercial purposes is often called—labors incessantly and successfully to lower the standard of photographic art and to make it a cheap-jack business. That he occasionally turns out a genuine picture is not to his credit. It is an accident. He takes a factory or a reservoir with as much satisfaction as the loveliest sylvan nook, or the most picturesque ruin. He is as blind as the snap-shooter; as void of taste as the mannerless "fiend."

Photography, nevertheless, does rise to the height of art. It has its own difficulties, which must be surmounted; its own beauties, which must be brought out. It does not seek to supplant painting; it has its own domain, rich enough and varied enough to satisfy the most exacting. The painter has advantages not enjoyed by the artist photographer; the latter is therefore all the more spurred on to excellence. But the photographer must do what the real painter does: study and observe. No mere exposing and developing of plates suffices. No simple taking of any subject answers. The artist *selects*, and the more judiciously he selects the more satisfactory are the results. A picture must compose, to use a technical term, and this whether it be a landscape, or group, or a single figure. It is important, therefore, that the principles of artistic composition be well understood if a genuine picture is to be obtained. These principles are laid down in books; illustrated in numberless works of great artists. The observant study of paintings of acknowledged merit, of engravings and etchings of the same rank, is of immense value in developing taste and knowledge. The same subject will be treated by two persons, and the result, in the one case, be commonplace, in the other artistic. An example of this is furnished by the two illustrations of "Late afternoon before rain," taken purposely by the writer to illustrate the point. A hull, a beach, a cloudy sky, a bit of sea and distant shore. In the one case the result is absolutely poor; there is no composition, the lines are all alike, the eye is neither attracted nor satisfied. In the other, there is a central object, the lines run well into each other and differ sufficiently to give the needed variety; the blurred sun is seen, the beach has a value, and the composition forms a picture because it is a composition—that is, the same elements as in No. 1 have been wisely used.

Lines are important, but not they alone; masses must be studied and properly balanced. All the light must not be in one part, and all the shadow in another. The light must not be of equal intensity all over the picture, and the shadows must not be of uniform depth. Half tones, gradations are absolutely necessary, and the most striking contrasts are not produced by the mere juxtaposition of black and white. The light must be handled like the lines, and the proper combination of the two will give an artistic photograph. The figure illustration will exemplify this.

The eager amateur will ask for the formula. Formulas abound for the chemical and mechanical processes of photography; brains, taste, study are the only formula that can be given for the artistic side. It takes thought to turn out a good picture with the camera, just as much as with oil or water colors. It takes real work during a prolonged period to obtain good results; hence the scarcity of artistic photographs among amateurs and professionals alike. But to produce a few good pictures is, when once experienced, infinitely more satisfactory than to turn out scores of characterless stuff. Study photography as an *art*, and do not be discouraged if you do not at once succeed.

The photographer must put himself, his own personality, into the composition. It must give the feeling that that particular point of view is his own way of seeing the subject; that the pose is his conviction of what the best pose is. Individuality, where it exists, lends great charm to a composition. It is this seeing a thing for one's-self and reproducing it with that particular characteristic stamped on it that interests one. The higher the artistic feeling and power of the photographer, the more marked his individuality, the more striking will be the picture and the nearer to a great work of art.

At present color is practically out of the photographer's reach. The loss is not so great, by comparison with the gain of color in painting, as seems at first sight. Vast numbers of paintings disappoint or irritate through the color scheme employed in them. A few suggest the light glow, the color flush which is not mere paint, and thus satisfy. The artist in photography can suggest color nearly as well—not as well, of course, but quite sufficiently to delight a trained eye. Warm tones, a particular process, the balancing of light and shade, a bright bit sparkling here, a rich shadow there, will give an *impression* of color not always realized by the beholder, but existing nevertheless, and largely contributing to what is "the nameless charm" of the picture. The suggestion of space, of atmosphere, can likewise be obtained, and when, in addition, there is *feeling* in the landscape, the group, or the figure, the photographer can call himself an artist, in the truest sense of the word. He has earned the title.

MR. FRENCH'S FIRST PHOTO—THE KING OF THE ZOO SUCCUMBS TO FEMININE AUDACITY.

By Alice Lee Snelling-Moqué, Washington, D. C.

THE way of the feminine journalist may be hard in some instances, but surely of all places in the land Washington is their Mecca.

Starting off armed with note-book and camera to obtain material for a magazine article, it became necessary to intrude into the *Sanctum Sanctorum*, the second story, of the Smithsonian, one morning recently.

Although entirely unknown to the gentlemen there, the desired information was most kindly furnished, and the trepidation of the reporter was changed to a laudable determination to pay a tribute to the courtesy of Washington gentlemen on the first opportunity.

The note-book was hastily pocketed as the sun came struggling out, and the bells and whistles shrilly announced noon.

Lunch couldn't be thought of, every moment of sunshine being precious if the residents of the Zoo were to be caught by the camera, for in these winter months the actinism of the light grows wonderfully less after one or two o'clock.

Arriving at the Zoo, the polar bears were successfully caught enjoying a cold dip, and standing at the cage on their hind legs begging for peanuts. Then the buffaloes, elk and other animals were taken in turn, a snap-shot at each being all that was necessary, as they were out of doors. But now was to come the great effort. Mr. French, the three-year-old lion, and King of the Zoo, who had defied cameras and photographers, must be taken.

French is a native American, being born in Alderson, West Va., in 1890. His mother was in the menagerie of French's circus, and

From Photo by A. Lee Snelling-Moqué.

MR. FRENCH.

having given birth to a litter of three cubs, they were presented by Mr. French to a Mrs. Bebont, of Alderson, to raise, when three days' old.

One died shortly after birth—the mother having stepped upon it—the second followed not long afterward, leaving French as the sole recipient of Mrs. Bebont's care and affection.

The little fellow thrived and grew. Having the freedom of the house, he followed the lady about at her work, like an affectionate dog.

When a year old, the lion having outgrown his home quarters, and his kind patroness realizing the impossibility of properly caring for him in the future, he was transferred to the National Zoo, where he is to-day, after only a two years' residence, the delight and pride of both keeper and public.

French was lying down when the cage was reached, looking so mild and tractable; the tripod and camera were adjusted with great satisfaction, and the focus was being found when it was discovered that French was *non est*, having walked to the extreme limit of his cage disdainfully, showing a decided disinclination to remain in one spot a single moment after having caught sight of his *bête noir*, the camera.

Mr. Blackburn, the head keeper, anxious for a picture of his pet, most obligingly suggested he would go into the cage and the photographer could follow, and so obtain a view without the bars.

The suggestion, being taken as a joke, was readily agreed to, upon which the keeper, being entirely unaware of the beating heart and trembling limbs of his photographic companion, helped the unfortunate over the iron rail, and proceeded calmly to unlock the iron door of the cage.

That moment will remain always vividly distinct in memory. What was to be done? A gathering crowd of sight-seers watched eagerly for the next step in the interesting and unexpected diversion.

"Come on, Johnnie! She's er goin' to get in!" a freckled face urchin exclaimed, frantically pushing his way to the front, while French, catching sight of his keeper, stopped short in his pedestrian tour of his cage, all attention.

Let all those people smile at a feminine lack of nerve! Never!

Boldly stepping to the open door, the camera was placed carefully upon the floor of the cage a few feet in front of the lion, who, absolutely dazed at the audacity of the intrusion, needing no command of the keeper, sat perfectly still.

Eagerly watchful, his great yellow eyes followed intently every movement of the trembling fingers that adjusted the focus. The look upon his majestic face was such as to in no wise increase the desire to prolong the interview.

What an eternity five seconds can be! but at last it was over, the cap replaced on the camera, the slide slipped in, and French's first photo was *un fait accompli*.

With what satisfaction this picture will be shown, and how (un)-truthfully every one will be assured, "No, indeed! I was not at all afraid, oh! dear no!" nor will it be necessary to explain that French was so particularly quiet because he had never seen a feminine hat with bobbing plumes so close before, and the *look* of that hat, after emerging from the focusing-cloth, might, indeed, make even a lion stare!

LANTERN FANCIES.

By Gould W. Hart, Brooklyn, N. Y

THE photographer who is interested in lantern work can find an interesting field in introducing novelties in connection with photography to be used in the lantern.

For instance, I photographed one of the old-fashioned windows in the house where John Brown was born; the panes of glass are 5x7, and there are sixteen in the sash which I photographed. In looking through the house, which is now unoccupied, I found a pane of glass loose from the sash, and I brought it home. I now make a lantern slide of the window and cover it with this piece of glass, which is uneven and full of bubbles, but that makes it all the better.

When I show this picture on the screen to my friends, I explain to them that they are looking through a window from the house in which John Brown was born, really through the very same glass. I dissolve this into a picture of the old house; this slide is also covered with a piece of the window-glass.

Another window pane is taken from an old Dutch Colonial House, in which, during the Revolutionary War, Lafayette quartered his soldiers for a time.

A piece of this glass placed in the lantern shows distinctly letters cut by the soldiers with their diamond rings.

Still another piece of glass is taken from an old New England Tavern, where Washington often made his headquarters, and through which he must have often looked; this is used to cover a slide of himself. I have several interesting slides which are intended to be dissolved one into the other. One set is named a barrel of sugar. First I photographed an empty sugar barrel, with several children's hats in the foreground. Without moving camera, hats or barrel, I placed four children in the barrel, with the tops of their heads just sticking out, and exposed again. The third negative shows the little folks with their heads and shoulders out of the barrel.

Contact slides were made from these negatives, care being taken to have the barrel come in the same position on each slide, so that when it is projected on the screen it will remain always in the same place, while the children will gradually appear.

Another set represents: First—The side view of a beautiful little girl with her fingers clasped around the neck of a small white kitten, holding it out at arm's length.

Second—The same as above, but the kitten is being held by the tail. This is entitled, "Which will you have, Heads or Tails?" Other subjects for dissolving sets will suggest themselves, and add much to the interest of a lantern evening.

It seems to me that the amateurs who are interested in the making and use of lantern slides, may improve the variety and quality of their work by making sets of slides as above, to be used in a double or triple lantern only; also, by making their slides all alike, so that when a dissolving lantern is used, they shall register—all appear precisely on the same place on the screen, instead of jumping here and there all over it, and by insisting upon having the best lantern service. Do not allow your slides to be shown in public unless you know a first-class stereopticon is to be used, and a competent man engaged to handle it. Why should not the law oblige electric or oxy-hydrogen lantern operators to obtain a license, certifying to their knowledge and ability to manage one, as well as the engineer of a steam engine.

A FAIR COUNTRY.

By Dudley C. Hasbrouck, Peekskill, N. Y.

FOR some time past it has been my custom toward the close of each year to make a little journey through a certain country whose salubrious and temperate climate, and whose cheerful and intelligent inhabitants are particularly agreeable to me, and whose varied and beautiful scenery is celebrated the world over.

At this time, in the neighborhood of my own home, the first signs of approaching winter are both felt and seen. There is a hint of frost in the early morning air, the birds have left us for warmer lands, and the withered flowers and leafless trees speak most eloquently of a dying summer.

But the land to which I go gives no such melancholy impressions to the traveler. It would not be truthful to say that it is always summer there, that there are no changing seasons; but it has always seemed to me to differ from other countries in this, that as one journeys along the highway, he can never tell whether the next turn in the road will bring him a view of an ideal winter scene or a smiling spring or summer landscape. And, paradoxical as it may sound to the stranger, the sojourner in this country neither trembles with cold when he admires the frozen streams and the trees bending to the ground with their burden of clinging snow, nor does he seek the shady side of the way from which to feast his eyes on the cloudless skies and the sunny fields of August.

And the pleasant people I meet there! Nowhere else will you find men and women so frank and kind. So ready always to answer all your questions in detail, and to illustrate any doubtful points; so willing to pause in their various occupations and talk with you, often brilliantly and always as a friend, ready at once to take you into their confidence, of the romantic views and the sometimes perplexing customs and manners of the country.

Nearly every one owns and uses a camera of some kind, from the smallest kodak to the larger tripod box, and the work they do is always most artistic and interesting. So excellent, indeed, in both composition and finish, that I always hesitate to show any of my own photographic attempts, and yet, so just and discriminating is their criticism, and so honest and hearty is their praise, that I cannot at times resist the temptation to open my album for their inspection.

Seldom do I visit this beautiful land by myself. Its many attractions gain an added value when enjoyed in the company of a congenial friend, whose adventuresome tastes and artistic feelings harmonize with one's own, and it is with just such a friend that I propose to start soon on my annual pilgrimage, both of us filled with the most delightful anticipations.

Reader, need I say that this country is found in the pages of "The International Annual of Anthony's Photographic Bulletin."

FLASH LIGHTS.

By Harry W. Smith, Newark, N. J.

As there is nothing new under the sun, I hope you will not look for anything of the kind in this article.

What I do want to say is this; I think that the majority of amateurs fail to realize the amount of pleasure there is to be obtained from a simple flash or magnesium lamp. Odd corners of the house, family groups, or shadows, are just as valuable as any outdoor view, and you don't have to go miles to get them.

If you are blest with great wealth, you can buy a good lamp (William's), for a cool hundred dollars; but I am satisfied with my little dollar and a-half affair, and can make a picture with it that comes very close to daylight effects.

If your lamp has a cotton or woolen wick, replace it with asbestos, as this does not smoke or smell, and lasts for years.

Now look out for mirrors, and dark or varnished walls or ceilings.

Select a bright room, and you will get a bright picture.

Don't fog your plate by getting the lamp in front of your lens.

Don't let your subjects stare at the light, but direct their attention some other way.

When all is ready, start your lamp and move it from left to right in an arc, as far as you can reach.

This movement is the main secret in flash light work, as it does

From Photograph by H. W. Smith.

FLASH SILHOUETTE.

away with that hard and chalky face, softens and tones down all the bright objects and brings out plenty of detail.

Just try it once and notice the difference between it and the stationary light.

Now for shadows or black and white effects.

You will find this a most interesting amusement for a winter evening.

The best place for this work will be in a house where they have a front and back parlor, with folding doors between.

Stretch a sheet over the opening, and then place your subjects as close to the screen as you can get them, get your camera in focus on your subject in the same room, and not on the other side of the screen, as is usually done.

Turn down your gas or lamps, and then go into the other room, stand about eight or ten feet away from screen and give one *very short* flash.

You have no idea how little light it takes, and your first attempts will be overtimed.

A shadow picture taken this way is very sharp and clear, and the features are recognized at once.

The subject being left alone in the room, will assume many comical positions, impossible to get were the operator present. The flash being so short, it becomes almost instantaneous work, and it is hardly necessary to use that threadbare warning, "Please keep still."

Your regular developer will work just as well on a flashlight negative as a daylight, and for a shadow picture, work for contrast and not detail.

COLLOTYPE FOR NON-PROFESSIONALS.

By Hy. Pickering, Leicester, England,

Hon Sec. Leicester Photographic Society.

FOR two years past, the process known as collotype has engaged all the spare time I have had, either practical experiment or hard thinking, but by constant and persevering working I have at length arrived at such degree of perfection as gives me that pleasure in observing the results of my labor, which is only to be experienced when a passable result is arrived at after a long series of experiment and careful note. I have great pleasure in presenting to the readers of this useful Annual a short description of the process and the *modus operandi* thereof (I had hoped the Editor would have let me off this time, as I have been a regular contributor for so many years). I may say in starting, that although perfectly at home with the chemical part of the process, I was quite a tyro at the practical or inking-up part, although I have chanced to come across one good old friend, who, also a photographer and worker in collotype, has, by a constant interchange of ideas and results, made the work more easy and congenial than if it was a solitary search; but I

NEGATIVES BY D. L. ELMENDORF

ST. PAUL'S

1. WITH 4 X 5 DALLMEYER R.R. LENS ONLY 2. WITH 4 X 5 DALLMEYER R.R. AND TELEPHOTO ATTACHMENT

have on the one hand found that those who knew nothing of the process were willing enough to offer their suggestions and commence for themselves at the point where they left me; I have on the other hand discovered that those who knew anything of the process were particularly careful to keep it exceeedingly snug, and therefore, as there was nothing to be got out of them, it behooved me to flounder. I have been handicapped considerably in knowing so little of the tricks and dodges of the printer, which are so necessary in the process; but even these dodges discover themselves to the patient worker, and if my process will give such gratifying results with the aid of a rubber roller squeegee for an inking roller, and a letter copying press for a printing press, I am quite sure that an experienced printer, with proper materials and apparatus at his command, will be able to turn out superior work, and in that case I hope those who desire instruction from my remarks will not be above sending me a specimen of their work. Now to proceed. The first requisite is a piece or pieces of $\frac{3}{8}$ plate-glass, polished and without a scratch; these must be finely ground on one side by placing one piece on a sheet of paper, then about a teaspoonful of fine emery powder, and moistening it with water and rubbing it vigorously with the flat side of the other piece, renewing the emery as it feels to work smoothly and loses the bite. Be careful to grate the edges of the glasses together, before commencing, so as to take off the sharp cutting edges, or lacerated fingers will be the consequence; then, when equally ground all over, wash well under the tap to remove every particle of emery, and dry before the fire. The next thing to be done is to prepare the substratum, which is very necessary, to retain the subsequent gelatine film on the glass. This is made as follows:

White of one egg is well beaten to a froth and allowed to subside and filtered through cotton wool, then add water 10 ounces, and silicate of soda 1 ounce. This must be well shaken and poured from one vessel to another to liberate every atom of gas; now take the glass plates, wash in water, and pour over the surface a small quantity of the albumen compound, and off at one end; repeat the process and pour off at the opposite end and allow the used liquid to escape. Dry this before the fire. Any number of plates may be thus prepared, as they will keep indefinitely; now prepare the sensitizing fluid as follows:

Bichromate of ammonia	30 grains
Gelatine..	1 oz.
Water...	10 ozs.

and dissolve by heat and filter.

Level the glass plate and pour on a plate 4x3 inches half an ounce of this and allow to set. then place in the drying cupboard to dry; of course, half a dozen or any number may be prepared, but the sensitized plates will not keep more than a week. When dry, print under a good plucky negative—with a shaped mat between to provide a "safe edge" and thus prevent the edges of the negative "taking ink," allowing twice the time to print you would the same negative in silver. When printed, soak the chrome negative in water until all the unaltered bichromate is washed out, using fresh water as soon as the previous washing becomes a deep yellow, and until the whites of the negative are perfectly free from the yellow tinge of the sensitizer; then dry the negative, or *cliche*, as it is termed, not using any artificial heat. Now to print, soak the negative or *cliche* in a solution composed of equal parts of glycerine and water for an hour; take out, drain and remove the superfluous moisture with blotting paper, and proceed to ink-up, using an india rubber roller and a very sparing supply of ink, which should be the very best litho ink procurable, when the image soon begins to be apparent and steadily builds up in the manner of developing a properly timed negative. Then place a piece of glazed paper over the image, and insert in the press and give a steady pressure, and on taking it out, the print in printer's ink will be found more or less perfect After a few inkings-up it will gradually assume the condition of a perfect print, and will give perfect satisfaction if the details are perfectly carried out. One or two things require to be borne in mind; the plates must not be dried at too great heat, 100° or 110° is the proper heat, and the *cliches* must be damped with the glycerine liquid between every six impressions or so; if not the whites take ink. The amount of ink must be sparingly distributed. Above all, do not expect proficiency in the first attempt, and beyond even that, do not be discouraged at failures, for you will have plenty, but stick to it; when a fault appears, work at it until that fault is remedied and master them one by one, and you will enjoy the infinite satisfaction of finding yourself able to produce any quantity of good prints at a minimum of cost.

HISTORICAL NOTES AND A BRIEF ACCOUNT OF THE RECENT IMPROVEMENTS IN PHOTO LENSES.

By Dr. Hugo Schroeder, New York.

AT a remote time, at the childhood of geometrical optics, the mathematician, as well as the practical optician, struggled to solve the problem of producing a true optical image from an object on a screen. At first sight this problem does not appear a very difficult one, as a fine pin-hole in an opaque screen will serve to produce a true image on a screen; but, unfortunately, such an image is very faint (from want of light), and suffers from a want of definition, which means that the outlines of the object are very indistinct as they appear on the screen, so that the so-called grain of the image is a very coarse one. Besides this defect, all the half-tones of the image are gone. In reality, an image thus produced is not much better than a shadow of an object.

If we want to produce an image of superior quality on a screen, we are obliged to employ lenses to accomplish the result in place of a pin-hole; but we must not forget that with the introduction of lenses as image-forming agents, we introduce at the same time all the defects inherent to lenses, from which the pin-hole was free. The first step necessary to correct these defects is that which holds true in all cases. When we meet with defects, we must first acquire a thorough knowledge of the nature of these defects before we can even hope to correct them, and this is what I will now endeavor to make the reader acquainted with. As I mentioned before, the pin-hole stopper produced a poor, but true image. We might get the best idea of the defect of lenses when we compare the constitution of the "pin-hole image," with the "lens image."

If we do not take the "Perspective Anomalies" into account (see Dr. Schroeder's book, "Elements of Photographic Optics." Chap. 4), which no lens can correct as they are now used, we may first deal with that defect called the distortion.

We call an image distorted when the marginal parts of the image are either smaller or larger than they would be in the "pin-hole image."

A network of squares would therefore appear in the image in the first case as the meridian lines on a globe, so that the image has the appearance of being convex, and this has misled some writers on optics to think that the image was curved, as a network of straight lines on a flat piece of sheet lead would appear if the piece of lead was bent or curved afterward; but this idea is entirely wrong, as we will see afterward that an image can be curved (vaulted), and notwithstanding this, the lines of the network can be produced quite straight.

In the second case the network of lines will appear "pulled out" toward the margin, so that the field will appear *concave* to the eye; but this also is a delusion, as these concave lines (toward the limit of the field of view) may be sharp all over when projected on a plane screen, and the image flat. A lens, or system of lenses, which distort the image of an object is making more or less a "caricature" of the object. In some objects, as, for example, a group of trees or rocks, this defect is not so apparent, but it becomes very offensive when such a lens is used for architectural work, and cannot be tolerated at all for copying purposes, such as maps, etc.

When the distortion is limited to each oblique cone of rays, the effect is that this cone is not pointed to one sharp point, but in numerous points in succession, each having another focus. This discrepancy will form on a screen a brush of light like a comet, and is therefore called "Cometa" or "Coma."

This defect is particularly destructive to the definition. This aberration is only adherent to *oblique* pencils in well centered lenses, otherwise the coma will also appear in the center of the field and is the main cause for bad definition of ill-centered *systems.* This "Coma" has the peculiarity that in one case the brush of light is directed from the optical axis, and in the second case the brush of light is directed toward the axis. As in the first case the position of coma is that adherent to a simple convex lens, and therefore is called "*under-corrected Coma*," in the second case it is called "*over-corrected Coma.*" It is understood that the *Coma* can be corrected when there are sufficient elements at disposal in a system, and that the Coma is *practically* corrected in all so-called *Symmetrical Systems by the principle of Symmetry.* We have now to deal with the curvature of the image, an aberration which may, from a mathematical point of view, be called the most untractable of all aberrations which are adherent to lenses or a system of lenses, and, therefore, is the last of all which has been mastered by the mathematician. That this problem has been solved is only due to the great talent and ability of the lamented and famous Prof. Petzval, at Vienna, and his assistants, and the great interest taken in the matter by an Austrian Archduke.

Prof. Petzval worked with one scientific assistant and eight calculators, provided by the Austrian Government from the Artillery staff of the Austrian Army. The solving of this problem appeared so hopeless that even the great mathematician, Prof. Airy, wrote about it in his excellent treatise about Astigmatism, in 1827, that it was hopeless to attempt to eliminate this aberration, which is closely related to Astigmatism, as we will see anon. It is understood that the *practical optician*, with his experiments resting only on experience, was utterly powerless to solve such a problem, as he was unable to find the true reason for it. It appeared very curious to the experienced practical optician that they never could reverse this aberration—viz.: that they always got an image so curved that the center of that curve was situated to the incident light, and never could the image get curved so that the center of the curve was situated on the side of the image.

The nearest they could get to it was a *flat image* (*so-called*), as the marginal pencils were so "*benedicted with aberration*," as Prof. Petzval said, that nobody could give a definite focal point to the marginal pencils, or, as Mr. Wenham expresses himself, as "*drowned in aberration.*"

It may appear curious to some of my readers, who know the fine combination of lenses which are due to Prof. Petzval, that the images of these lenses, though very perfect, are not *absolutely flat.* This was recognized by Prof. Petzval himself, as the practical condition to be fulfilled could not be accomplished then, as the proper material could not be procured—viz.: a crown glass of higher refraction and lower dispersion than the flint glass to be attached to it.

As these experiments are very costly, the "*brutal question of money*" was the real hindrance which delayed the solution of this problem for such a long time, and if Prof. Abbe had not made such strenuous efforts, we would not even now be in possession of such highly valuable material for optics as is now produced at Jena.

Many years ago, when Prof. Abbe began his first researches in optics, and frequently visited me in Hamburg at my establishment, to get acquainted with all the new methods (scientific and practical) which I invented for producing optical lenses, we had a long conversation about those points, especially referring to the production of a new material for optical purposes.

I imparted to him the fact that I started with my friend the famous glass melter, Theo. Daguet, at Solothurn, in making magnesium crown glass, and provided Prof. Abbe with a prism of this glass, but also adding that our money was all gone, as we had to make our experiments with large crucibles containing about 500 pounds of glass. Prof. Abbe then said, that as it was hopeless to get sufficient money for such purposes from private persons, that he intended to ask the government for help. With the assistance of the Prussian Government (who twice paid about 50,000 marks), and the assistance of a practical and scientific glass melter, Dr. O. Schott (formerly owner of the glass works at Witten, a. d. Ruhr-Westphalia), they began their experiments on a small scale, with very small crucibles, at Jena, later establishing the now well-known Jena Glassworks of Schott & Co., who have, by the supply of their new glass, revolutionized the practice employed in geometrical optics; but notwithstanding all the progress with glass produced to gain a flat field of view, and simultaneously compensate all the other aberrations, we are limited to about an aperture of f/7 with a field of about 70°, as with larger apertures and a similar field the aberrations are not sufficiently compensated for. There is still, therefore, a good margin for progress in this direction, as we can only get high refractive crown now at about an index of refraction of 1.6 for the yellow rays, and it may take some time before we reach the refraction of the diamond of about 2.4 to 2.6 for yellow rays, from which Prof. Petzval said at the time, "with diamond lenses instead of crown glass, it will be child's play to produce large lenses with flat field, and perfect in every other respect." I found long ago that perfectly flat fields could be obtained also with glass of the old kind, if the distances between the lenses of a system could be increased far beyond that which is suitable for ordinary photographic lenses, and I constructed on this principle with full success, a system of lenses for the German Expedition for the observation of Venus (to ascertain the Parallax of the Sun). See Dr. Schroeder's Book. Pages 208, 209, 210. As soon as the new Jena glass came into commerce, I was the first to use it, and invented a new lens which gave a perfect flat field, the so-called "Ross Patent Concentric Lens," and which is unsurpassed up to this day for flatness. The lens, derived only by calculation, was so unusual in its construction, that the foreman of Ross & Co. refused at first to make the lens, with the remark that I must have lost my reason from the extensive calculations I had made about lenses in general, as such a lens could not produce a focus at all. It was on November 30, 1886.

When I sent the result of my calculation into the workshop to be carried out, and which is used unaltered up to this date, the first photographic trial of this lens did not show a good result, but I saw on examination that the image was with f/20 totally over-exposed. Of course no one had any idea of the actinic power that I had given to this lens, as it must be understood that two lenses, both of the same aperture, are not always of the same speed. The more transparent the material employed for actinic rays, and the more perfect the rays are united, the faster will be the lens with the same aperture.

Messrs. Ross & Co., did not hasten to patent this lens, notwithstanding all my warning, and did not market the lens until other opticians had also made some progress.

The date of application for concentric lens patent is April 7, 1888, two years after my invention. Complete specification accepted April

6, 1889, did not differ in the slightest respect with my lens, calculated November 30, 1886.

Some time after the invention of my lens I visited my fatherland, "Germany," and also my late friend Prof. Hartnack, the famous microscope maker, whom I often supported with my knowledge of optics, and made there the acquaintance of a young and talented gentleman, Mr. Miethe (afterward Dr. Miethe), and at his request, as to how to produce flat images, I directed his attention to Prof. Petzval's valuable paper about the real mathematical conditions. He began to work then with Prof. Hartnack's practical assistance, and produced a lens with a flat field, but in other respects imperfect, and invented the name of "*Anastigmat*," which has spread over the entire optical world, and which is sometimes abused by using it for lenses which are not anastigmatic.

As I intend to explain what astigmatism is, and also the freedom from astigmatism, the anastigmatism and its connection with the curvature or vaulting of the image, I will conclude my paper with this matter, hoping that these few lines will bring a better understanding of these very important optical matters. The astigmatism has been known long ago, as well as coma and distortion, but in optical literature it did not appear much before 1827 (see Transactions of the Cambridge Philosophical Society. Vol. III., Part 1.), as the famous Astronomer Airy had treated it. As far as I know, his attention was called to it by the appearance of the spider webb in a Ramsden eye-piece. If the two cross wires are situated in the center of the field, they focus simultaneously, but when these cross wires are on the margins of the field, they want different adjustments of the eye-piece to be focused sharp. The main feature of astigmatism is such that the focusing of an object produced by an oblique cone of rays (which ought to be simultaneously sharp when free from astigmatism) is divided into two focal lines—one vertical to the other. One of these focal lines is directed to the axis.

In focusing these lines one after the other, you will find that sometimes the line directed to the axis has the shortest focus, and sometimes the longest.

In the first place it is over-corrected, and in the second place under-corrected astigmatically. Under-correction is that aberration which is adherent to a simple convex lens. Over-correction is that adherent to a simple negative lens. If a lens or system of lenses are so combined that the under-correction is balanced by the over-correction astigmatically, then the lens is called an anastigmat. In most cases it is not difficult to remove astigmatism entirely, but in many instances the *over-corrected* astigmatism has been used to flatten the field, and people who are ignorant of this fact judge in a wrong way about the ability of the optician who constructed such a system. The optician, however, who introduced over-corrected astigmatism in such a lens, did so with the full knowledge of this defect in order to remedy the flatness of field. An image flattened by astigmatism is better than even the otherwise most perfect curved image, as the former can be focused simultaneously over the whole field, whereas the curved image can only be focused in the center or in a circle concentric to the center of the field, which may finally extend to the margin of the field according to the position of the lens to the plate or screen.

THE NECESSITY FOR CARE IN PRINTING

By J. R. Husson, New York.

IT was a job to get out that big porcelain dish, test the silver bath, rub off the albumen paper with a piece of canton flannel, then float two or three minutes (and the pesky edges would curl, if we had kept the paper in a too dry place before floating), drag the sensitized paper over the glass rod or edge of the dish, hang up to dry, then fume and cut. Then we must use it soon or it would turn dark and go into the waste basket, for how many of we amateurs saved the clippings? The tone, too, was not always satisfactory, and even if it was we had been told that albumen prints were not permanent, and so all of our trouble, even if with satisfactory results, would give us a joy of limited duration.

Surely, then, we had only cordial greetings for aristotype paper, for it came ready sensitized and cut in sizes to suit, it would keep ninety days, and toning was a most simple process. Even a toning and fixing bath would give a wide range of beautiful tones and permanent prints.

I have found this all very true; but "exception" they say "makes the rule." I had occasion to hunt up a missing print, and overhauling my boxes, I found to my dismay many faded pictures of a horrible greenish tint which were apparently all right when I last saw them, and that was not many months before.

Data regarding them I cannot give, excepting that they were upon gelatine aristotype paper and not over a year old. Most workers and all experimenters with this kind of paper have undoubtedly produced these wretched tones, but to have had them all right for a considerable length of time and then so change, was a new experience to me—of course the fault is mine. Not properly fixed or washed, or maybe I used the toning and fixing solutions too long, though they are advertised to be used so long as they tone satisfactorily. The immediate results were undoubtedly so, or the prints would not have been mounted. I cannot think it due to the mounts, for the albumen prints were all in perfect condition and some of them eight years old. I felt very much as if I should haul out that big dish again. The lesson learned was that aristotype prints are not to be made with haphazard methods; they have their requirements as well as any other kind of prints, or any other branch of photography. So much hypo will fix only so much silver, and so on all through the list. The pictures in those boxes on aristotype paper of both gelatine and collodion, which were intact, were as clear and brilliant as when first made, showing clearly that with proper manipulation they are as pleasing and permanent as albumen and all the other conveniences in its favor. Idleness begets laziness, the more done for us the less we care to do—"Press the button and we'll do the rest"—and usually there is not much worth doing. Aristotype paper does so much for us, I fear we begrudge what little we have to do.

THE WATKINS EXPOSURE METER.

By W. J. Hickmott, Hartford, Conn.

FOLLOWING some experiments made with the Watkins Exposure Meter on the correct timing of negatives in making copies under the skylight, and finding that the results obtained were exceedingly gratifying, and believing that equally good results would follow under the different conditions of light and subject in landscape work, I made a number of experiments in the field, basing the time of each exposure upon the figures given by the meter. The results were certainly interesting and conclusive as to the value of that instrument. My experiments under the skylight had led me to rely implicitly upon the correctness of the figures given by the meter. I had doubted it a good many times at first, and had put my own judgment against it, but I generally found that my judgment was wrong. On one occasion the meter figured an exposure of 2½ minutes. I did not think it possible that it should be as long as that, so gave the plate 1 minute. On development I found it greatly under-timed. Two minutes gave much better results, and finally I gave three minutes, and the result was a good negative, slightly over-timed.

The only difficulty I have had has been to tell when the sensitive strip of paper and the standard tint were of the same depth of color, the paper never showing the same color as the standard, the latter having a slightly greenish tint, which is never present in the sensitive strip, and hence I have generally made the mistake of letting it get too dark, thereby over-timing my plates.

In the landscape work I chose subjects that were difficult to judge by the appearance of the image on the ground-glass, and worked entirely by the meter, developing the plates with a normal developer, using pyro and potash. The plates were over-exposed, but developed up to sufficient density to make fine prints by the Aristo process, being full of detail, and not wanting in contrast. One of the subjects was a wooded path, and the meter figured 25 seconds, as the proper exposure. Another subject was in the open, a stream, with trees on both sides but with plenty of light. The meter figured on this 3 seconds. Both were developed in the same developer, at the same time, and both came out good negatives. Both were overtimed somewhat, but one apparently no more so than the other, showing that if a number of plates are exposed according to the meter, they will all be exposed alike, and on developing if the first one is found to be over-exposed, the developer may be modified to suit all the rest, as they will all be alike. Had I developed the negatives as I usually do landscapes, treating them as over-timed, and commencing development with the normal quantity of pyro and one-half, or less, the usual quantity of accelerator, I could have got anything desired from the negatives, but I wished to make the test on normal developer. The results proved the value of the meter and demonstrated its practicability. I have found it invaluable in making copies, and now find it just as valuable in landscape work. It is an instrument that will soon pay for itself in spoiled plates, and as a temper preserver it is "out of sight." It is seldom convenient, and is always expensive, to experiment with a number of plates in order to get the correct time. If the plates are small, and one has plenty of time, it is well enough to get your exposure by cutting and trying, but when one puts an 18x22 plate into the camera, and is decidedly uncertain as to the proper time to give it, the exposure meter is a friend indeed. It takes time to develop a large plate like that; lots of developer, lots of patience, a good deal of "know how," and you don't feel like exposing plate after plate trying for a certain effect. It is a great thing to have the meter assume some of the responsibility by giving you certainly very nearly the correct time. It is so nearly correct that it is easy to modify the developer one way or the other, while the plate is developing, so that when finished it is just what you want.

CORSICA.

By G. E. Thompson, Liverpool, Eng.

' My dream is of an island place,
  Which distant seas keep lonely;
A little island on whose face
  The stars are watchers only.
Those bright still stars ! They need not seem
Brighter or stiller in my dream.

An island full of hills and dells,
  All rumpled and uneven,
With green recesses, sudden swells,
  And odorous valleys driven
So deep and straight, that always there
The wind is cradled to soft air."

—Mrs. Browning.

LAST April I visited Corsica, the most beautiful island in the Mediterranean. It is easy of access, there being lines of steamers from various ports on the continent. Leaving Marseilles at 5 o'clock one evening, we landed at Ajaccio at 8.30 the next morning.

For foreigners, Corsica is a winter and spring resort. There are many good hotels in Ajaccio, and the charges are moderate. At the "Grand"—the largest of all—you can pension at 7 francs per day. Toward the end of May, the heat drives visitors away, or up among the mountains, and then the *Hotel de Monte D'Oro* fills to overflowing. This hotel is situated at a height of nearly 4,000 feet above the sea, near the center of the island in the forest of Vizzavona. There is scarcely another house within a radius of many miles from the hotel, but when there you are amid some of the grandest and wildest scenery in Corsica. Monte D'Oro towers up in front to a height of 8,000 feet; forests of giant pine, and of grand old beech trees clothe the sides of the valley, and foaming rivers flow among them in their bowlder-strewn granite beds. This delightful place is within three hours of Ajaccio, for there is a railway station at Vizzavona. The line winds up among the mountains, and two trains journey each way during the day. From Ajaccio to Bastia—on the east coast—it is a long day's journey by rail. In the center of the island there is a break of over 20 miles, where the line is not yet finished, and consequently from Vivario to Corte the journey must be made by diligence or in a carriage. Corsica is 114 miles in length by 50 in width. For the most part it is grand, wild, and mountainous. Only about 10 per cent. of the land is under cultivation, and great forests clothe the mountains, together with the *maquis*, a sort of jungle formed by a dense growth of arbutus, *bruy-*

ères, cistes, myrtle and other shrubs. Chestnut trees grow to an immense size, the older ones generally being hollow with age. The fruit forms the staple food of the country people. The *bruyères* is a tall white heath. It is from the root of the plant that so called *briar* pipes are made. It is sawed up into shapes ready for turning, and forms one of the chief exports of the island. Charcoal is another staple of trade, in which a large business is done.

The Corsicans as a race scorn to labor with their hands. For many centuries they were engaged in warfare with the various nations who invaded the island, and oppressed the inhabitants, and now that the country enjoys peace, and has become a French department, the men spend their time in discussing home politics and in the struggle for power. Every commune is divided into clans. Individual conscience is swamped in the clan conscience. The clan that is in power oppresses the others, and so bitterness and revenge are rife and crime abounds. The old institution of the vendetta still exists. A man commits a murder and flies to the *maquis*. He is then a bandit and an outlaw; his clan and his friends look after him and provide him with food and clothing. In time he is murdered by the friends of his victim, who, in their turn, become bandits, and so it goes on. In such a paper as this we have only time to give a passing glance at the state of Corsica as it now exists. There are said to be hundreds of bandits in hiding among the mountains, and yet the tourist is quite safe. These men are not brigands, and unless driven to extremes will not molest a traveler.

The most interesting point to us just now is the photographic aspect of Corsica. The country is full of beauty and variety. The climate is grand, and subjects are plentiful. You may spend days about Ajaccio and its magnificent bay; there is the town, the shipping, the market and fisher folks. The buildings are not picturesque, but they group nicely. Napoleon's house stands in a back street. It is kept as a show house, and photography is allowed inside the various rooms. Much of the family furniture stands there yet, as it stood in his father's day. In the town hall there is a Bonaparte museum, where are many family portraits and busts, including Canova's beautiful bust of Napoleon, a bust of his mother and a cast of Napoleon's face taken after death.

To visit the numerous places of interest in Corsica you must charter a carriage and pair. This costs from 18 to 20 francs per day. The driver looks after everything, and you have no further trouble after paying for it. There are excursions from Ajaccio which take three and four days, and the last which I took was a journey of thireen days in company with a friend. We chartered the carriage vith the stipulation that the driver should stay when and where ve wished, so that we might photograph. He was to be allowed hree days' rest, when and where he pleased, for the horses. We iad a grand time, and never regretted our bargain of 23 francs oer day for the man, the carriage and horses. Of some of the councry hotels, the least said the better. The beds were sometimes alive! You are obliged to rough it. Our route lay southward to Sartene; hen over the Col de Bavella—one of the grandest of Corsican passes —to the east coast. From Solenzara down to Bonifacio and up the vest coast to Ajaccio.

The tourist must be provided with a passport. The gendarmes iad their eyes on us everywhere! Descriptions of us were wired on rom town to town, and in Bonifacio our passports were demanded oy a detective—in the street—and while he took them to the mayor ve were obliged to sit in the hotel for hours, on a bright sunny afternoon, waiting till we had them returned to us. The government are uspicious of spies, and any sketching of fortresses in Bonifacio vould introduce the artist to the interior of a French prison.

I left Corsica with much regret, never having enjoyed a country nore. During the four or five weeks of my visit, I took 600 ¼ olate negatives on glass.

A PLEA FOR PHOTOGRAPHY.

By Maurice T. O'Connell, New Haven, Conn.

IT is many golden years ago since I, as a young man, took up photography. The step was a serious one, and duly deliberated on oy fond parents and friends. Of course the outlay was a puzzle, as he cash necessary was scanty, and had other calls elsewhere; but hen as a set off, it was argued the boy will have a good profession or trade, something to fit him in the struggle of life and enable him o hold his own. Thus arguing, fond hearts and hands supplied the ieedful, and the necessary catalogues were ordered, and very soon he whole outfit was to hand, and I and a very dear elder friend dabbling away for bare life, spoiling lots of plates and chemicals, but iaving immense pure pleasure out of it, and, what is more, imparting hat to *others*. So the early days and years of my photo experiences *flew*. Each summer a new impetus was given to our hobby by the arrival of my friend on a three weeks' vacation. Those were golden days in the old home. I have nought but the remembrance of them iow, and an album filled with copies of some of our negatives.

But how priceless *those* pictures are. What compensation for the outlay.

I have not as yet made much money out of the art, perhaps I never shall; but I have got a great deal of pure pleasure out of it, and I have got sunny memories of the happy past, that can never be effaced.

The years after the outlay for that camera grew darker and darker, until finally the old home, with all its boyhood associations, had to go. I had to bid good-by to all, even to my dog, and cross the threshold of a once peaceful artistic spot, to go 3,000 miles o'er old ocean, to the New World, to find the right to live which had been denied me there. One thing in all my travels, when my heart was almost broken, comforted me *then*, it was my art. I had carefully for months before pasted in an album (supplied by my friend referred to), copies of all the negatives I had on hand, until it was full, turning it over page for page. I had a full record of that home and past I was bidding a sorrowful farewell to forever. There were pictures of friends and relations, our first attempts, crude and untouched; badly printed and toned, yet priceless. Here was a simple study of a sister's head, with a simple white bib on, a silver chain and locket, and a June pink moss rose stuck in the dress.

How well I can recall the posing for that vignetted head and the bright June day on which it was taken. Here, a study of an old wrinkled nurse, a faithful retainer of the family in sun and shine, who has since gone to her God; there, a landscape of the old burial-ground at home, with the ivied ruins and the place where my own dead lie peacefully sleeping until the great summons. A group of figures, all squatted on the grass, eating their dinner, brings back memories of a pleasant picnic under monastic ruins. Some in that group are dead; some that have loved and lost, separated—and yet the picture stands. Those are inner bits in the life of one person; mayhap they may be of no interest to anybody but to myself, but, sitting here to-night after almost twelve months spent in the new land, I can look at that album and live my past all over again.

Is it not pleasant, is it not good? How many would wish to do the same, if they only could. But thousands have yearly to cross the ocean, as I have done; thousands have to say good-by to the old home, old friends, loved ones, and yet they retain no souvenirs, save in fond memory. Had their parents placed them on a higher level; had they at great inconvenience to themselves, equipped their sons with the power to use the camera, they would have a great deal of pleasure added to their lives. Of course, all have not been gifted with the artistic instinct; but to those who have, I say, by all means go in for photography. If it will not bring you in the dollars, it will repay you tenfold in years to come, as it does me to-night, when poring over your album of scenes and friends passed away.

You renew your acquaintances with the loved and lost, and live a chapter of the sweet dead passed over again, all by the simple aid of an amateur photographic outfit.

ROUND ABOUT FOLKESTONE AND DOVER.

By Joseph Chamberlain, Tunbridge Wells, England.

LOOKING for a change, Folkestone was determined upon as being high, bracing and reputed to be very healthy, and, in consequence of its being one of the direct routes to the continent, there would be a great deal of life to be seen, as much interest would be evinced by the arrival and departure of the boats to the continent, large numbers of visitors making it a point to see passengers embark and disembark. There is a splendid service of steamers belonging to the South Eastern Railway, who run their trains from London right on to the Quay. All this makes it a charming locality for the camerist; the vessels entering the harbor and through the swing bridge into the inner harbor afford boundless work for any one interested in photography, and the possessor of a camera, be it hand or stand, as from here so many places are within reach, that one may gather a large store of seascape, landscape and architectural subjects, which will not only be a reminder of a pleasant visit but memories of ancient times, and really may become a partial survey of the antiquities of a district. It appears by some that the Saxons called it "Folcestane," though it was known to the Romans as, and in the Doomsday Book the name is spelled, "Falchestan." Eadbald, king of Kent, built a castle and church here in 630, and his daughter, Eanswitha, founded a priory and became first prioress. How this was destroyed is uncertain, either by the Danes, or the inroad of the sea, but it occurred about the year 1052. In 1092 Neville de Mandeville founded a priory for Benedictine monks, with a church, but in consequence of the devastations of the sea it was removed to the site where the present church stands. This is dedicated to S. S. Mary and Eanswythe, and is deserving of a large amount of notice, as it is a very ancient structure. The vicar, the Rev. Mathew Woodward, who has held the benefice for forty-three years, has exerted himself immensely for the purpose of procuring funds for its restoration, which he has been most successful in carrying out, and it will afford an interesting study to the architectural student. It is a complete cruciform edifice, consisting of central tower, nave, chancel, north and south transepts and aisles, a lady chapel and baptistry. The chancel appears, by the simple but elegant mouldings of its small narrow windows, to be one of those erected or rebuilt in the early part of the twelfth century. In the north wall there is a fine tomb. There is also a stone coffin which was reported, when found in the seventeenth century, to contain the body of St. Eanswythe, in excellent preservation. Some years since a subterranean apartment was broken into during some alterations, and was found to be nearly filled with ashes and fragments of human skeletons.

A handsome stained glass window has been placed in the west front, in memory of the celebrated Dr. William Harvey, the discoverer of the circulation of the blood, who was born here in 1578. The medical men of Great Britain contributed a good round sum for the purpose. The stenciling of the walls, with handsome patterns, and also some fine paintings on the walls, and the stained glass windows, of which there are seventeen, add considerably to the embellishment of the building. There are numerous other churches, Christ Church, St. Peters, Holy Trinity, St. Michael and All Angels, the vicar of which, the Rev. E. Husband, is a good musician, his organ recitals being quite noted. He is also an amateur photographer, and is at the present moment arranging for an exhibition of amateur work to be held in August, 1894. There are also several non-conformist chapels, schools being attached to all. The town hall is a spacious building, and was built in 1856. It faces the Sandgate Road. The Lees is the fashionable part, and must on no account be forgotten. They extend for a distance of about a mile and a half and run along the verge of the cliffs, facing the sea. Laid out in asphalted walks, divided by green sward, from one hundred to one hundred and seventy feet above the sea, and during the season a densely fashionable crowd of youth and beauty promenades the walks throughout the afternoon and evening, and at times the outline of the white cliffs of the French coast can be distinctly traced. Proceeding westward, a pleasant walk may be had to Sandgate, about two miles distant. This town was brought into great notoriety on account of the enormous landslip that occurred a year or two back. Here we find Sandgate Castle, built by Henry VIII. as a coast defence. The celebrated J. B. Gough was born here (the celebrated teetotal lecturer), his father having been a soldier in the Fortieth and Fifty-second regiments. About three miles from here is Hythe. The famous military canal runs through it, and extends to Appledore

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CHILD STUDY

BY ARTHUR & PHILBRIC

a distance of twenty-three miles. Along its banks will be found plenty of work for the camerist. The church, which is Norman and partly early English, has, on the west side of the north transept, a Norman doorway, with zigzag mouldings, banded shafts and delicately carved capitals, and has a deeply recessed arch with chevron ornaments. There is also a most interesting relic, which is an enormous mass of human bones and skulls, contained in the crypt; but it is impossible to say when, or how they were put there, as by some it is supposed there are as many as 7,000. Several of the skulls have deep cuts in them. Most likely they are Saxon. To photograph them early morning is the time. Permission can be obtained from the vicar. There is also a remarkable Saxon tower to the church, with a conical stone roof. It is of ancient rubble work of unusual thickness, supposed to have been erected in the eighth or ninth centuries, access being gained at the back of the pulpit. In this churchyard lies the body of the inventor of the lifeboat, Lionel Lukin by name. A stately avenue of elms, called the Ladies' Walk, leads to the seashore. The government School of Musketry is here, and this makes it lively. By taking the train from here to Westenhanger, the remains of the old Palace, which is very ancient, is worth seeing. Fair Rosamond's Tower is still remaining where she was confined before she was removed to Woodstock. It has passed through the hands of a great many of the nobility of note, and must have been a stately mansion in its palmy days. Saltwood is only a walk from Hythe, and should be visited. The castle dates from the time of the Romans. In the fifth century it was enlarged and strengthened by a son of Hengist, and still further by Hugh de Montfort. In the days of the Normans, it is said the knights who murdered Thomas à Becket slept here the night before. There was a moat around 150 feet broad and 30 feet deep; a cinerary urn with ashes and bone fragments, and an amphora were found here some years ago, and the remains of a hypocaust. Lyminge has what is supposed to be the oldest church in the country. It is a Saxon building with Saxon masonry and Roman bricks intermingled with masses of reddish concrete, much the same as found in the Roman Pharos at Dover Castle. A beacon turret is at the corner of the tower. It is supposed the original church was built in 633, as beneath the present one a large Roman building is traceable. Paddlesworth, or "Frog's Court," possesses

> "The highest church, the lowest steeple,
> The smallest parish, the poorest people"

in the county of Kent.

A walk from Folkestone may be had to Sugar Loaf Hill, a huge cone, and from the top, in addition to a glorious view looking toward the sea, will be seen the town of Folkestone. The viaduct is worthy of notice. It is 768 feet in length and is 100 feet high from the hollow. Close by here is the Holy Well, where it is said pilgrims on their way to the shrine of Thomas à Becket quenched their thirst. Cæsar's camp, or Castle Hill, is about 500 feet high, and is one of the most prominent of the Roman earthworks in the neighborhood. The general plan can be traced, also the intrenchments internally. It measured about 150 ft. A few fragments of pottery have been found here. The hills around here are a happy hunting ground for the entomologist. The visitor must not forget to visit the Warren. This long stretch of weatherbeaten chalk cliff, when viewed from above, looks like a perfect miniature Switzerland, with its huge blocks of chalk and quiet pools of water. At the commencement of summer it is in its prime. It does not matter whether you carry a camera, or whether you are a botanist, entomologist, geologist or naturalist, everything is here, and if you are none of these, the grassy slopes, the fresh breezes and the lovely view will solace and mentally soothe and influence you. I must not omit Shorncliffe camp, situated at the back of the town of Sandgate. This was first made in 1794, and Sir John Moore trained many a regiment for the Peninsular War here. No doubt the visitor may be fortunate enough to witness a parade or review, which would make a subject for a snap-shot. A fellow member of the same photographic society was staying at Folkestone, which made it very pleasant, and a joint excursion to Boulogne by the *Louise Dagmar*, a splendid boat, was most enjoyable. On our arrival we found the market place full, the women with their large white bonnets making splendid subjects for the hand camera. Then there is the "Porte des Dunes," "Le Beffroi," "The Cathedral," "Church of St. Nicholas." The museum and picture gallery in the Grande Rue is well worth a visit. We were fortunate in gaining access to the citadel, which was once the residence of the counts of Boulogne. over which we were shown. It is used as a barracks now, and we were shown the spacious underground apartment called La Barbiére, with a magnificent vaulted and groined roof. The late emperor was confined here. There was no difficulty found in photographing the places of interest, but it is necessary to be careful when near the fortifications. It was arranged that Dover should form part of my trip photographically, and for that purpose a short ride by rail brought me to the town. I wended my way up to the castle, hoping to get permission to secure views of the different towers and parts of any historical interest; but the officials were inflexible, a written order had to be procured from the general commanding the southeastern district, who resides at the Constables' tower, and who alone had the power to give it (this was Major General Lord William Seymour), and he being away on leave made it still more difficult, and so my trudge up the hill to the castle, under a broiling hot sun, was to no purpose. I had to content with views about the town; but through the kindness of Colonel Kingscote, A. A. G., who, in reply to my written request, granted me a permit, I was enabled to secure some views. Dover is the principal of the Cinque ports, about 76 miles from London by rail, and is the nearest landing place from the continent. The names given in the numerous publications show it to have been spelled in a variety of ways, "Dwyr," from "Dwyffrha," a steep place by the sea. The castle is open for visitors between sunrise and sunset, either by the Constables' Tower or the Canon's Gate, and they are allowed to go to the church, the keep, armory and as far as Queen Elizabeth's pocket pistol. The Pharos or Watch Tower was a lighthouse in the Roman Castle. It is supposed to have been built some time before A. D. 53. It stands close to the church. The exterior shape is an octagon, and the interior a square, the sides of which are each about 14 feet, the walls being about 10 feet thick. It is impossible to determine the original height of this edifice, as time has played such havoc that it is now reduced to 40 feet. In the original building of it, there seems to have been seven courses of stalactitic composition, and then three courses of Roman tiles alternately. One of the constables in the year 1259 altered its external shape from hexagon to octagon, by casing it with flint—some of this casing has fallen off and revealed the original structure. A peal of bells were hung there and it did duty as a belfrey to the old church, the founding of which has been attributed to Eadbald, as well as to the great Earl Godwin; but toward the close of the twelfth century several alterations were made, which included the insertion of a fine pointed doorway on the north side of the nave. The sedilia and piscina were added on the southeast angle of the nave. At the western entrance is a small window worthy of notice; it commanded a view of the light on the altar in the southwest angle of the nave, without entering the church, and is a Norman lychnoscope. There is here, certainly, a link from the early Britons, Romans, Saxons and Normans up to the present times. The keep is a massive stone built edifice, nearly square, its walls being 24 feet thick, between 90 and 100 feet above the ground immediately surrounding it, and about 470 feet above the level of the sea. On entering the keep one has to ascend the grand staircase, at the top of which a passage in the wall leads to the royal apartments, and on the left of this passage by a gallery, also in the wall, the visitor is shown the well which Harold swore to deliver over to William the Conqueror. The armory is shown containing the store rifles for the district, and also lances used in the Crimean war, tattered flags from the Redan, the prison chamber of Edward, son of Henry III., bedchamber of Charles I., also used by Queen Elizabeth. The Colton tower and gate formed the southeastern entrance into the fortress. The Constables Tower was erected by John de Fiennes, the gates being guarded by two portcullises, the grooves of which are still visible, and the bridge, when drawn up in the recess, formed a complete defense. The Duke and Duchess of Clarence, afterward William IV., and Queen Adelaide, resided in this tower during part of 1819. Peverel's Tower and Gate, the southwestern entrance, has an arched gateway and drawbridge. Queen Elizabeth's pocket pistol should on no account be missed. It is a fine specimen of a brass gun, is 24 feet long and was supposed to carry a 12-pound ball seven miles. It was presented by the Emperor Charles V. to Henry VIII., and was cast at Utrecht by James Tolkyns, A. D. 1544. It is splendidly adorned with a variety of rich and beautiful devices, and has these Dutch lines on it:

BREECK SCVRET AL MVER ENDE WAL BIN IC GEHETEN
DOER BERCH EN DAL BOERT MINEN BAL VAN MI GESMETEN

of which the following is a popular translation:

"Load me well, and keep me clean,
I'll carry my ball to Calais Green."

Close here are the officers new barracks, which cost about £50,000. The building is faced with ragstone, the front being 383 feet long. On the western heights the remains of a round church have been laid open, which is supposed to have been erected toward the end of the twelfth century, and was connected with the Preceptory of the Templars, as mentioned by Leland and others. They consist of a circular foundation of nave 32 feet in diameter, with a sacrarium eastward 24x20 feet, and again Leland mentions only three of these churches built in England. On the ridge of the plateau, to the southwest of the Redoubt, is the citadel, defended by deep ditches and numerous flanking and masked batteries. Lines of communication and subterranean excavations connect every part of these extensive fortifications, which are sufficiently capacious to inclose a numerous army.

Shakespeare's Cliff is 350 feet above the surge that washes its seaworn base, and in "King Lear" he thus describes this towering precipice:

"Come on, Sir; here's the place, stand still. How fearful
And dizzy 'tis, to cast one's eye so low!
The crows and choughs that wing the midway air
Show scarce so large as beetles; halfway down
Hangs one that gathers samphire—dreadful trade!
Methinks he looks no bigger than his head!
The fishermen that walk upon the beach,
Appear like mice, and yon tall anchoring bark,
Diminished to her cock, her cock, a buoy,
Almost too small for sight. The murmuring surge,
That on the unnumbered pebbles chafes,
Cannot be heard so high. I'll look no more,
Lest my brain turn, and the deficient sight
Topple down headlong."

The cliff is close to the South Eastern Railway station. There is the Admiralty Pier, where departure is taken for the continent, and it is worthy of note, that three days' circular tour tickets are issued from Dover to Calais, Boulogne, Folkestone and back or *vice versa*, for 11 shillings. The trains run on to the pier, so that passengers can walk on to the steamers, which are of first-class order. The pier is 700 yards in length, and on the west side is a promenade unequaled in the kingdom. It provides a perfectly safe landing-place at all times of the tide for the mails from India, China and the continent, and also for the passengers brought. The Lord Warden Hotel is noted as being where the notabilities are received on landing, as there is communication with the railway station from the hotel, by which they can resume their journey to London. There is a large turret in a fort at the sea end, in which are fixed two 81-ton guns, from which projectiles of 450 pounds have been successfully fired with the same weight of powder.

Dover museum contains a well arranged collection of fossils. The Maison Dieu must be seen. This was erected by Hugh de Burgh at the end of the reign of King John; several brethren and sisters were located there, for the purpose of dispensing hospitality to any strangers or pilgrims who might be passing. The windows are worthy of inspection; that over the entrance is in the early decorated style, and has five principal lights, with, above them, tracery forming four large trefoils within a circle flanked by two elongated quatrefoils, with five smaller trefoils beneath the whole, and immediately over the lights first spoken of. Each principal light contains a full length figure of the founder and four principal benefactors of the hospital. The center figure is that of Hubert de Burgh, Earl of Kent, Lord Chief Justice of England, Lord Warden of the Cinque Ports, and constable of Dover Castle, the founder of the Maison Dieu; on his right are Kings Henry III. and Richard II., on his left Henry VI. and Richard III. At the upper end of the hall and around, are more windows, all historical and deserving of much attention. Near here are the town hall and municipal buildings. St. Martin's le Grand or Dover Priory is second only to the Pharos mentioned before, as it was founded in 1132, and all antiquarian photographers should secure copies. St. Mary's church in Cannon Street was probably built by the canons of St. Martin's le Grand; the writer was fortunate enough to secure a copy of this, which will be impossible again, as a large block of houses on the opposite side of the road had been pulled down, and from the vacant space a good view was obtainable. St. Radigund's Abbey, a short ride from the town, is well worth a visit. It is a ruin and covers a large space of ground, being founded about the year 1190, by a Norman knight, Hugh de Flori, a kinsman of the Conqueror, for the White Canons. Several interesting towns can easily be reached from Dover. Walmer has a castle which is the official residence of the Cinque Ports, and beyond is Deal Castle, Ramsgate, Margate, Sandwich and West Cliffe, where the church of St. Peter's contains a memorial, dated 1629, to Mathew Gibbon, the grandfather to the historian of the "Decline and Fall of the Roman Empire." The above afforded a great deal of work for a holiday, and a corresponding amount of pleasure, which I hope any one who attempts it will find; and if I have given any information in any previous communication that has assisted a brother amateur, I hope this may do likewise.

HINTS FROM MY NOTE BOOK.

By Edw. H. Keith, Worcester, Mass.

DIAPHRAGMS.

DIAPHRAGMS or stops are, as a rule, marked or numbered in some way to distinguish them and for comparison. The most general method of marking is $\frac{f}{8}$; $\frac{f}{11}$; etc. What do these marks signify? How many amateurs or professionals know? Hardly one in twenty.

For convenience the diameter of the stops have been made a definite part of the focal length of the lens. The (f) above the line stands for the focal length, and the figure below the line represents the part of the focal length taken. For instance, if my lens has a focal length of 8″, and my stops are marked $\frac{f}{8}$, $\frac{f}{11}$, $\frac{f}{16}$, $\frac{f}{32}$, $\frac{f}{64}$, etc., the diameter of my stops are 1″, $\frac{72}{100}$″, $\frac{1}{2}$″, $\frac{1}{4}$″, etc.

To find the focal length of a lens, provide yourself with a long bellows and a camera. Take a 4″ scale, mark its length on the groundglass; place the scale in front of the camera, and bring it into correct focus, the image being the exact size of the scale. Measure the distance between the object and the image; one-fourth of this is the focal length.

Of what practical value are these marks? They enable a person to compare the work of different lenses on an equal basis; also to use the same relative diaphragm, even though the diaphragm has a diameter of twice that of the other lens. After an exposure is known for a certain stop, a table of relative exposures may be tabulated for the whole set.

THE MANAGEMENT OF FILMS.

After exposing a roll of films comes the task of developing. At once the film begins to curl, and it is almost impossible to keep it flat. One is apt to lose patience and declare that plates are much better as far as ease in developing is concerned. If one uses pyro, the fingers are stained, especially if many films are developed at once. Even with a stainless developer it is disagreeable to have the fingers continually in the developer.

In a very simple manner all this may be overcome, and the film kept perfectly flat. Take either a piece of hard rubber or a glass plate, round and smooth on the edges, place the film upon this support and fasten (at ends) with an elastic band. Now place the whole in a tray, and you may develop as easy as you would a glass plate.

The part of the film covered by the elastic band is the waste ends, and so the film is not harmed in the least.

REFLECTIONS.

Often one sees a bit of wood or landscape reflected in a pond. It might make a pretty photograph. It may be in the morning or during the day that it is photographed.

After development the negative not satisfactory, there is too much light and the reflection is not strong enough. Another negative is made with the same result. What is the trouble? After repeated trial I have found that the best results are obtained just before or at sunset. At that time, on a pleasant day, the sky is generally clear, the water is calm, and the intense sunlight is absent. The water takes on a whiter or bluer cast, and throws the reflections into bolder relief. A small stop and plenty of time, with a slow plate, give the best satisfaction.

PHOTOGRAPHING AT THE BEACH.

When photographing at the beach or from a steamer, it is best to use a slow plate or film, a small stop and a quick speed shutter, because the light is brighter and much more intense on account of the reflections from the water. In this way more contrast is obtained and the results are very pleasing.

ARCHITECTURE AND THE CAMERA.

By C. H. Bothamley, Taunton, England.

TO many people the pleasures and attractions of photography are greatly increased by taking up a definite line of work, so that their pictures are not simply a collection of disconnected items, but form a series illustrating some special feature of a country or countries, some branch of human enterprise, some aspects of social life, and the like. No line of work yields such satisfactory photographic results as the study of architecture, and none is of much greater general interest. In England, the numerous great cathedrals and churches, ruined abbeys, and castles ruined or otherwise, afford abundant scope for work of this kind. In America, though modern architecture has shown very striking developments and furnishes abundant subjects for the camera, it lacks the glamor of antiquity and historical associations. A systematic photographic study of the still existing parts of old America, and the characteristic features of its public and domestic architecture, would be an extremely interesting line of work. Doubtless, most of the available subjects have been photographed many times before, but that is equally true of the more numerous subjects in the older country. Every one, however, looks at things from a somewhat different point of view, and every new series shows points of novelty and interest not to be found in those that have been done before.

For architectural work the camera must have a rising and falling front and a swing back, and a wide angle lens will be found to be a necessary part of the outfit. For interior work the spikes of the tripod should have shoes of cork or india rubber, to prevent their slipping about on tiled or marble floors.

The camera should also have spirit levels or plummets fitted to it, in order to ascertain when the base of the plate is horizontal—the edge of the plate vertical. If the buildings are at all out of the perpendicular, it is practically impossible to judge by mere inspection whether the camera is properly leveled.

Not unfrequently in architectural work the camera has to be tilted considerably, and this is usually done by means of the tripod legs, with the result that the tripod becomes less stable and is easily knocked over. Recently a tripod head has been put on the English market, which consists of two boards hinged together at one end, the tripod legs being attached to the lower board and the camera to the upper. By means of a slotted strut and a clamping screw, the upper board can be tilted at any desired angle, and, of course, tilts the camera with it, while the lower board (which constitutes the tripod head proper), remains level, and the stability of the stand as a whole is not materially affected. This simple contrivance will be especially useful in architectural work.

Halation is, of course, one of the chief troubles in architectural work, and although it becomes most marked and injurious in the case of interiors, it is a common mistake to suppose that these are the only cases in which it has to be guarded against. As a matter of fact, the halation along a roof-ridge or a line of battlements against a bright sky is sufficient to destroy that distinct "pitch" against the sky which gives so much atmosphere to a picture.

The two ways of preventing halation are, as is well known, either to use thickly-coated plates or to back ordinary plates. Personally I dislike thickly-coated plates, and prefer to back as many plates as seem likely to be necessary. If only you have a dark-room in which the plates can be dried, there is no trouble about it. With a convenient holder it is not difficult to unpack, back, and put up to dry, three dozen quarter-plates in half an hour, and larger sizes only take a little longer. The most convenient backing material is the mixture of caramel and sienna, recommended by Debenham. It is not only effective as a light absorbent, but does not become powdery when dry, and yet is easily cleaned off with a damp sponge before development. Those who are not afraid of a little trouble will find it a distinct advantage to back all their plates; the improved quality of the results, especially in subjects where the contrasts are strong, amply compensates for the trouble.

Don't forget to keep the plate vertical by means of the swing-back; don't under-expose; don't forget that if you want a piece of complex detail to show up properly, you must photograph it from the shadow side.

PHOTOGRAPHIC INSTRUCTION AT THE OHIO STATE UNIVERSITY.

By J. N. Bradford, M. E., Columbus, Ohio.

REALIZING the incalculable value of photography to all branches of scientific and technical work, the author appealed to the university authorities for facilities by which photographic instruction could be given the students in the Science and Engineering courses of the Ohio State University.

This request was generously granted in 1890, and from this date the study of photography is a part of the curriculum of the above courses.

The chief aim is to give the governing principles which underlie the subject and sufficient practice in them, so that the value of photography as applied to scientific work is thoroughly appreciated.

They are made to realize that the present perfection of plates, processes and apparatus does not reduce photography to the "touch of a spring," or "the turn of a crank," and all is theirs.

The laws of lenses, the conditions of light and shade, and the chemistry of the processes remain the same, and must be studied if successful results are to be attained.

The belief that a brief account of the method of instruction followed in the elementary part of the work may be of interest to some of the readers of the Annual, prompts the writer to contribute this article.

The students before entering the class in photography are required to have pursued the following elementary studies: Drawing, physics and chemistry. This training gives a foundation sufficient to enable the students to readily understand the subject and progress rapidly. The instruction is given during the fall and spring terms of the academic year. The students devote about six hours per week to the work, consisting of a series of lectures on the underlying principles, which are verified in practice. The students are required to take notes of the lectures, are referred to photographic literature by the best authors, must keep an accurate record of all work, and from this data hand in a carefully written note-book of the term's work.

They are required to pass a written examination on the subject, and their practice work must be of a required degree of proficiency.

From this general statement the writer will pass on to the work in detail: Following the first or introductory lecture the subject of photographic optics is considered, defining the various conditions and qualities of light which a photographer must take into account.

This naturally leads to the photographic lens, the agent by which light is controlled and directed in forming the latent image; giving the forms of lenses, the general properties and aberrations, which are carefully explained and illustrated by diagrams. Such terms as equivalent focus, rapidity of the lens, depth of focus, angle of view and the stops, are each given careful consideration.

The stops or diaphragms is a topic of great importance, as it must be considered every time an exposure is made. Its position, and its influence due to position, its size and results due to size, system of numbering and reasons for, all must be understood to intelligently make use of them.

The subject of lenses is concluded by explaining each type of photographic lens, its construction, and the advantages, disadvantages and special adaptation of each type.

After considering the lens, the camera receives its share of attention; the tripod, camera front, bed, bellows, camera back with its swings and the plate holder are all explained and diagrams used wherever they will serve their purpose.

Following a very brief definition of the dry plate, the students are sent outdoors to make their first exposure. This brings them into actual working contact with the lens and camera.

Now, the lens question requires many answers from the instructor. The object of the first exposure is for each student to determine the required time of exposure for a given plate with a given stop. A bright sunlight day, about 2 o'clock in the afternoon, is selected. For the first exposure a subject having considerable gradation vertically, but with very little horizontally, is selected, and the exposure is made by drawing the plate holder shield one inch at a time and making an exposure of one second for each. A 5x7 plate of medium sensitometer being used, gives seven exposures on the one plate, varying from one to seven seconds. The result is, with a normal developer, at one end over-exposure, at the other under-exposure, and somewhere between will be a strip of about correctly exposed plate.

Each student develops his plate with no knowledge of the developer, its action or composition; all that is expected is that he will witness the behavior of the plate in the developer due to the exposure it received, and have pointed out by the instructor the strip giving the best results.

The time of exposure being determined for the plate to be used, and for a given stop, the students are again sent into the field to make several exposures, using different stops, and make the change in time according to the stop numbering system.

These exposures are developed with the student still ignorant of the developer composition and action.

At this point in the work the students are in a mysterious state relative to the developer, and are in just the right condition of inquiry to take up the consideration of the sensitive surface of the negative, its composition, the action of light on it so far as is known, the composition and action of the developer, and the composition and action of the fixing bath. This brings the work up to the finished negative, and after a few more normal exposures and developments, the students are introduced to the only correct method of development, the "tentative method."

They are required to make over and under exposures, and develop them with a normal developer, by the tentative method, and compare the results. By this time they have accomplished knowingly some mastery over the subject of exposure and developer which go hand-in-hand. Before proceeding further the subject of orthochromatic plates is thoroughly considered. The value is emphasized by giving examples made by both the plain and ortho plates, using the same subject. It is proper to say here that for almost all the work only orthochromatic dry plates are used. By this time the students will possess several negatives of their own production, and are naturally anxious to see the finished results, which will require giving attention to the subject of printing. Two methods are considered and practiced. First by artificial light and development, using bromide paper and the ferrous oxalate developer; and second, by printing out paper, using gelatino-chloride of silver and collodio-chloride of silver paper. Bromide paper is first used, for the reason that a large part of the manipulation is similar to negative work, which the students are familiar with; the additional information is given by a lecture.

Before using the printing out paper the composition of the sensitive surface, action of light on it, composition and action of the toning bath, and reasons for toning, composition and action of fixing bath, final washing and mounting are explained by lectures, using illustrations whenever practicable. After making a few prints by both methods, a better knowledge of the qualities of negatives is obtained, and the students return to complete their required list of outdoor negatives, which comprise a certain number of outdoor negatives of architectural subjects, views without architecture, outdoor groups and instantaneous photographs.

On all these subjects the students receive lectures before their practice. From outdoor work they are directed to interiors, which forms a somewhat difficult branch of photographic work, owing to the many variable conditions encountered.

Backed plates are used in all cases where windows cannot be avoided, and in cases where extreme contrasts cannot be easily overcome, the aid of the flash-light is added.

The students in mining engineering give more attention to flash-light work than the others, for the reason that it is supposed they will have need for it in underground work.

Under the head of copying, the student's work consists of copying from line drawings, from photographs, and from colored drawings; using in the latter the color screen. Closely connected with this work is the photographing of objects, such as pieces of apparatus, machines, models, natural history specimens, etc., to which they devote some attention and practice.

With the list of negatives completed, following the above plan, the students after making a print from each proceed to the very interesting and valuable photographic practice of preparing lantern slides by contact and by reduction, using a copying camera. The reason for deferring this part of the photographic instruction until this time, is that the students are better prepared to understand and practice the refinements necessary to produce slides of the best qualities. The slides completed, the class have the pleasure of reviewing a portion of their work with the lantern, an instrument now recognized as a powerful educational adjunct. All subjects, whether at great distances or near, large or microscopical in size, and many that are invisible to the human eye, can be photographed, and, by the aid of the lantern, exhibited on a screen for the instruction of entire classes; and what can be superior to the clear, accurate photographic lantern slide, projected by the lantern on a screen of any desirable size.

This ends the general photographic instruction as given by the writer to his classes, the supposition being that enough of the subject has been covered to enable the students to appreciate its value for scientific work, which is at all time kept prominently before them by lectures and illustrations. Feeling that the space allowed an individual in the ANNUAL has been transgressed, any mention of the applications of photography in the several lines of scientific work carried on at the Ohio State University will be omitted.

May what is given above tempt others doing a similar work to do likewise, so that co-workers may be able to compare plans. Without doubt, it will soon be rare to find a department of scientific or technical work without its photographic equipment, and it is equally important that the students of our educational institutions, who are to be our future scientists and engineers, be given instruction in this "Handmaid of Science."

TELEPHOTO LENSES.

By Abe Lizzard, New York.

I PRESUME that the telephoto lens is of too recent introduction to admit of much debate upon the different results obtained with it, and, in fact, the only samples shown thus far that have come under my inspection have been trials, more to show what the lens will do, than to produce artistic showings. That it is a great stride forward in photography must be admitted, and now that such lenses are made for time exposures, and yield such elegant results, I presume it will be but a short time before we learn that the producers of such have succeeded in overcoming the difficulties that now present themselves, and will announce instantaneous telephoto lenses.

With such, what marvelous things we could produce. Just think of it—children at play miles away, could be taken the same as if across the street; armies photographed in every manœuvre and during battle; vessels passing each other could photo their signals, and a thousand and one actions *recorded* that now are lost, because the lenses used render the images too small for use.

As it is, we can make great use of the present form of lens. The most powerful is the "Compound Form," consisting of a negative element attached to a portrait lens, of what Mr. Dallmeyer calls his Quick Working Series. The large photo of Mont Blanc, shown at the World's Fair, and taken at a distance of over 43 miles, was a beautiful example of the capacity of the lens. The later introduction of the "Moderate Power," consisting of a rapid rectilinear lens to which a negative element is attached at will, gives a lens of much more general utility at less cost, as the rapid rectilinear can be used separately for instantaneous work, copying groups, and the many calls demanded from it. With the telephoto attachment, the party can place his camera at a certain point, and take almost innumerable pictures, differing in features and beauty, without changing the position of the tripod. A general view can be made, and then each object of interest taken of such size as suits best. Any one who has shouldered his camera and knocked about the country knows full well how often he has planted his tripod, looked at the ground glass, and wandered about, seeking for the proper spot from which to secure the view. Now he has only to stop at such point as gives him the desired view, and capture it in all its details without moving. I tried to photograph with a telescope, having a camera lens, etc., attached, to achromatize properly. It was a long, laborious piece of work to do it, even after the apparatus had been specially adapted for it, and I was forced to take it the size it produced. Now, to make the same size picture, a telescope can be made of merely one tube or box sliding in another, with telephoto lens on one end, and plate holder and ground-glass on the other, allowing me to increase or diminish the resulting picture.

I hope before the close of another year, to see the exhibitions of the different societies teem with examples of telephotography, and, as far as possible, show alongside of each the result produced with the lens they ordinarily used for such work before the telephoto was introduced.

The fact that the negative element or attachment can be purchased separately, and added to any of the rapid rectilinear lenses issued by Mr. Dallmeyer, gives every one who possesses one of the latter a chance to join one to his lens at a moderate cost. Now that the maker has succeeded so wonderfully with them, new developments may, I hope, be looked for; and as many things heretofore deemed impossibilities are now being performed daily, it is difficult to place a limit; not only difficult, but who can do it?

The projectors of the Atlantic cable were sneered at, and told it could not be done. Well, it has been. Who would have thought one could talk with a friend far away and recognize his voice? Well, I have done it, and the friend was at least 250 miles distant. Improvement and advance are the order of the day, and it only awaits the suggestion from some active brain to start the many thousands of inventors working out the problem. All they need is an idea as to what is wanted, and they will furnish the finished machine or process. If photographic journals would open a "Critic" department, and devote one or two pages to letters from such as desired to criticize different articles, it would, without doubt, lead many to thinking as to the best means of overcoming some weak points aimed at, and thus insure a better article. As they occasionally publish letters to such effect, if it were known that they would be open to such, it might make such columns very interesting at times. They should reserve the right to eradicate all names, where such would be detrimental to the party's interest. I make this digression merely to say that in case such columns are opened, I will be an early critic on telephoto lenses, and loud in my desires to procure one for instantaneous work, if only so up to a certain power. The expression is general, "What wonderful results are shown by photography, and it is even now only in its infancy." If so, we may hope to see the desired lens, and dry plates, that work many times as quickly as the speediest now to be had.

The gelatino-bromide plate is not yet very old, and what improvements have been made in it. Two years ago, who would have imagined the telephoto lens, and yet we have it. The next few years may develop still further. Who can tell? The only thing left for us who are not ranked with the inventors is to get all out of the inventions that is possible, *i.e.*, to keep pace with them and understand all their possibilities. Then, and then only, shall we be ready for the new ones that are sure to come. We should not lie idly by, hoping that by waiting we shall save ourselves the experiments performed by others. If we do, we will never show a result, as the world does not stand still, and he who does will lose the race.

"A LITTLE KNOWLEDGE IS A USEFUL THING."

By Fred. W. Pilditch, Aston, England.

THE above saying, as you are aware, is directly in opposition to the worn-out adage, but there are many, amateurs and professionals, who know to their cost what time, trouble and money would have been saved to them, had they possessed even a slight knowledge of some rational, elementary technicality of certain whys and wherefores of the art which is now so *dear* to them.

How many amateurs (and professional men also) are there who do their work by the rule-of-thumb, so to speak, and have to risk the loss of *bath*, *batch* or *bargain*, when, by a little study, they might make themselves acquainted with just that amount of theory that insures practical success.

Have we ever thought of the vast amount of gold and silver lost in the photographic world by ignorance, when a simple knowledge of chemistry would have enabled those precious metals to return to the pocket in a form far more accommodating than that of residue? How many but a select few could understand such equations as the following? (given by H. Leach, in *Photography Annual for 1893.*) $C_6 H_6 O_3 + 2NH_3 + H_2 O + 2Ag_2 Br = C_6 H_6 O_3 O + 2NH_4 Br + 2Ag_2$, and yet I maintain that (with a blackboard, a few test tubes, a small number of chemicals in solution, and a clear description free from intricate and meaningless names), the whole could be so explained that even the most dense would understand and profit by a little

ETCHED NEGATIVE BY S. L. STEIN

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"SPRING"

knowledge in what was before to him mere guesswork and jugglery. It is, of course, only a simple matter to explain also that the silver bromide of the emulsion with which the plate is coated is converted by the action of light into a less stable compound, which is then ready to be acted upon by the thousand and one developers in the market, and the latent image on the plate converted into metallic silver.

The theory, of course, is easy to the scientist or even to the student; but the average photographic society member, never having had the opportunity to gain the information, is more or less in ignorance upon the subject. Now I feel assured that it would materially aid the maintenance of young societies, if the secretaries would take care to include in their programmes some lessons upon PHOTOGRAPHIC CHEMISTRY. I maintain that if a man were asked to come and perform one or two simple reactions, and explain a *few* equations by graphic or other symbol, that the members would learn how to avoid that *bugbear* to photography, viz.: EXPENSE, and by being shown the means by which they would use hundreds less of plates to disadvantage, they would see that at the society they profited by the little knowledge which they had there obtained. Now more errors are the result of the absence of such knowledge than from any other cause, and that much appreciation is evinced anent such lectures I know by experience. Let secretaries take my advice (if not previously tried), and follow my own plan of including an easy lecture of the foregoing description in each term of their programme.

Is a little knowledge of the behavior of the plate we are about to use a dangerous thing in exposure? Is a knowledge of the relative speeds of plates useless? Is the knowledge dangerous that citric acid should be thrown into the dish where a plate is developing too rapidly from over exposure? If so, why does Lyonel Clark, in his book upon *Development*, place such stress upon it? I maintain that it is not the LITTLE knowledge that is the danger, but the WANT of it.

Readers, endeavor to follow up the advice given by one of our greatest English thinkers, which reads:

Now know *something* of *everything* and *everything* of *something*.

APPARATUS FOR OBSERVING THE ELECTRICAL CURRENTS PRODUCED DURING DEVELOPMENT OF PHOTOGRAPHIC DRY PLATES OR FILMS.

By Col. J. Waterhouse, I. S. C., Asst. Surveyor General of India.

IN 1891 I described some observations I had made in Europe of the electrical currents generated during the development of photographic dry plates. On returning to this country, and repeating them, I soon found that better apparatus and a very much more sensitive galvanometer were required to enable the observed currents to be accurately recorded and measured, the principal difficulty being to avoid the comparatively strong independent currents between the terminals, which it was difficult to eliminate in my earlier experiments, especially those caused by accidental contact of the metal connections or plate holders with the developers. I therefore constructed the apparatus described below, and have found it answer the purpose very well, and provided that due care is taken these currents are reduced to a minimum if not entirely avoided. The apparatus is especially suitable for experiments with slips of glass plates or celluloid films, about three inches long and one inch wide.

A light wooden box, about three inches square inside and eight or more inches high, was made, blackened inside and fastened on to a base board about four inches square. It was fitted with a movable cover or lid about two and a-half inches deep, so as to avoid all chance of daylight penetrating into the interior of the box when closed. A block of wood a little smaller than the box, and fitted with wire lifting handles on two sides, carries a four ounce measuring glass containing the developer to be used. The lid of the box is fitted with two sliding rods, attached to connecting screws, taken from ordinary bichromate bottle-battery cells, the lower ends of these sliding rods being fixed in brass screw clamps, attached on opposite sides of a wooden block about one and a half inches long, one-third inch wide and half an inch deep, well paraffined or varnished. The screw clamps are made to hold a glass plate of ordinary thickness, or a celluloid film, so that the inner and coated faces of the pair of plates or films may be parallel and at about one-third inch apart.

The apparatus is arranged so that when the ends are fully drawn out the plates are quite out of the developing solution, but when lowered, they are well immersed in it, care being taken not to bring the wooden block too close to the surface of the developing solution, which might otherwise creep up the moistened gelatine surface and come in contact with the metal clamps or connections, and cause independent currents. The slips of dry plate or film, of which one in each pair may have previously been exposed to light and the other left unexposed, are first soaked for a few minutes in plain tap water, or in a weak solution of potassium bromide, and then laid, coated side downward and inwards, in the screw clamp, a piece of thin sheet platinum being placed between the sensitive surface and the brass, and fastened down with the clamping screw. The rods are then drawn out to their fullest extent, and the lid, with the pair of plates attached, is placed in proper position over the developing solution in the box.

All these arrangement smust be made in the dark-room; the box can then either be used in the dark-room or carried out into a light room, in which the galvanometer has been set up, and the necessary wire connections made with the terminals of the galvanometer, and the connecting screws of the developing box—the rod to which the exposed plate is attached being specially marked X, while the other rod may be marked U X. When all is ready for the observation, the rods are pressed down, so that the plates are properly immersed in the developer, and the currents generated can easily be observed on the scale of the galvanometer and measured in the usual way.

The galvanometer I now use is the improved form of Rosenthal's micro-galvanometer, made by Edelmann, of Munich. It is an exceedingly sensitive instrument, and the currents are much more easily and accurately observed than they would be with the unit galvanometer I used in Europe.

With another form of dark developing box, with which I am, however, not yet quite satisfied, I have been able to observe the reversed currents generated during the development of a much over-exposed plate, showing reversal after development.

GELATINO-IODIDE OF SILVER IN THE LIGHT ON THE ELECTRIC SPARK.

By Victor Schumann, Leipzig.

GELATINO-IODIDE of silver has heretofore been considered as being almost insensitive, because only after a very energetic exposure would it yield a developable image. Even then the coloration of the plate was so slight that the picture disappeared to within a faint trace in the fixing bath. This perhaps is the reason why some experimenters have declared that iodide of silver, precipitated with excess of iodide of potassium, is entirely insensitive under alkaline development.

When I was working on this subject some years ago, I omitted, in order to preserve the action of the light as long as possible, to fix my iodide of silver plates. I washed them, and, after careful drying, kept them in a place secure from light. They have not changed in any manner, and show to-day in equal intensity as formerly, the maximum of their light sensitiveness toward the solar spectrum in a small band near Fraunhofer line G. This is better visible by transmitted light than by reflected light.

My attempts at that time to obtain a strong image were unsuccessful, and only recently, when I have had occasion to occupy myself with the behavior of iodide of silver toward rays of the smallest wavelength, have I succeeded in obtaining something better, and to furnish thereby proof that even iodide of silver, so frequently considered to be insensitive, may, under certain circumsances, develop considerable sensitiveness. This unexpected fact, after its first observation, I was able to verify by a number of carefully made spectrum pictures, so that now every doubt as to its reliability is settled. Still I will this time, aside from the result, touch only upon those of the presumptive causes of this increase of sensitiveness and intensity of the gelatino-iodide of silver, which appear to have the greatest probability. A more extensive communication regarding this subject I reserve for some future date.

The methods adopted in my experiments were the following: I coated a glass plate with a very rich emulsion of gelatino-iodide of silver, and, after drying, exposed it to the spectral district of the wave-lengths 2,000 to 1,852 A E, and developed the image with alkaline developer, just as is done with a gelatino-bromide of silver plate. The result was unexpectedly favorable, as not only, as in my other experiments, did I obtain a few lines, but a continuous band appeared running over the whole plate, upon which the lines 30, 31 and 32 of the aluminium—of which my light source consisted—showed themselves with noticeable intensity. Although this enormous action of this, my first exposure, was partly a consequence of the great slit-width which I had selected—fearing the plates might not do the work—the result with the following exposures, made with a much narrower slit, showed that the plate was indeed much more sensitive than had been so far believed. But my surprise did considerably increase when I brought the plate in close contact with the spark, exposing it through a mask in which was an opening about one centimeter long.

The part of the plate left free by this mask gave an image even with exposure to several sparks only half a millimeter long, while with two Grove cells in connection with a small induction coil, giving sparks eight centimeters long, a black opaque image was developed. Repetitions of this experiment yielded similar results. This demonstrated beyond doubt that gelatino-iodide of silver is much more sensitive than had hitherto been supposed, and that it is more quickly reduced by the waves of smallest wave-lengths, as far as they had acted here, than by the light at our disposal in practical photography.

But I believe the following to be the most important thing to consider in reckoning the cause of this intense coloration, particularly as this latter occurred after direct exposure to the single spark. If the plate, as was the case in my exposure, is brought with its sensitive side as close as possible to the spark, the atmosphere between both will be reduced to a minimum, the coating of the plate being in actual contact with the points from which the spark passes. Now, I have shown some time ago that an atmosphere of only one millimeter thickness absorbs the whole light of the richly radiant district of the smallest wave-length discovered by me; but in this foregoing case, the thickness of the atmosphere separating the spark from the plate does not amount to a millimeter. The rays of extremely photographically-active light of the district of smallest wave-length had to be, therefore, wholly or partially effective. It is not to be wondered at, then, that my plate developed with high intensity. But further, my experiments with ultra-violet light have shown that the stability of the silver haloids decreases with the increase in oscillation number of the light rays. As the electric spark gives the largest number of oscillations of all light sources, so does the spark action produce the greatest effect.

This indicates that the manner of working chosen by me increases the photographic effect with gelatino-iodide of silver to the highest degree at present obtainable. That the chemical condition of the coating on the plate (film) comes also into consideration, I will not deny; but more about this at some later date.

Whether gelatino-iodide of silver will ever supersede gelatino-bromide of silver is pretty hard to decide at this time. So far, the former does not equal the latter in sensitiveness. But whether iodide of silver dry plates will ever meet with favor or not, my experiments have at least proved that the electric light, used in the manner described, is an excellent reagent to light sensitiveness for this material.

METHOD FOR RAPIDLY DETERMINING THE QUANTITY OF SILVER IN PHOTOGRAPHIC PREPARATIONS.

By Prof. Alex. Lainer, Vienna, Austria.

THE simplest method for determining the quantity of silver in any photographic preparation is to dissolve the silver salts in a solution of hyposulphite of soda, and then to estimate the silver by the method of titration.

The known titration methods with potassium iodide and starch paste, with sulphocyanide salts, or with sodium chloride, can find here no application, as no precipitation can be obtained from fixing soda solution. But a complete precipitation of the silver in the shape of black sulphide of silver will result from the addition of a sulphite of soda solution of known strength. I worked out a method and have recommended it in my little book, "Guide to the Rational Collection of Silver, Gold and Platinum Residues, and the Determination of Their Value." The process is the following: About thirty grains of crystallized sulphite of soda are dissolved in about one thousand cubic centimeters of water, and after eight days this solution is put into several bottles, well corked. A burette is now filled up to the zero mark with this solution. After this, exactly five grains of silver nitrate are dissolved in five hundred cubic centimeters of distilled water. After shaking, ten cubic centimeters of this silver nitrate solution, 1:100, are placed in a beaker and sulphite of soda solution added from the burette until no further precipitation is observed. By shaking the beaker occasionally a complete clearing of the cloudy liquid is easily obtained, and more sulphite solution is added drop by drop. Finally, the solution is heated and then more sulphite is added in drops, until neither cloudiness nor discoloration is produced. This moment can accurately be determined. The number of cubic centimeters of sulphite of soda that have been used is read off from the burette, and the value of its action on the silver nitrate is calculated. If, for instance, 6.2 c.c. of sulphite of soda solution had been used, then will correspond:

6.2 c.c. Sulphite of Soda Solution	to 10 c.c. Silver Solution, 1:100
6.2 c.c. " " "	to 0.1 gram Silver Nitrate
1 c.c. " " "	to 0.0161 gram Silver Nitrate
1 c.c. " " "	to 0.161 x 0.635 gram Silver

By this preliminary work we find out, therefore, how much silver nitrate or silver corresponds to one cubic centimeter of our sulphite of soda solution. This titration is repeated until corresponding results vouch for its correctness. With the sulphite of soda solution, whose value has thus been determined, the quantity of silver in any fixing soda solution can be estimated. The above method, worked patiently and accurately, will give very satisfactory results.

CELLULOID FILMS.

By Martin J. Harding, Shrewsbury, England.

WHEN first introduced, celluloid films were frequently subject to various most annoying defects in the way of spots and markings in the film, but these have now practically disappeared with the experience brought to bear in their manufacture. The films lie quite flat in the developer, the general manipulation being exactly the same as with plates, excepting as regards fitting in the dark slides. In washing, they may be placed either singly or in pairs, back to back, in the grooves of the usual tank, and they dry readily and safely when suspended by means of small metal ticket clips, or pinned up by one corner to the edge of a shelf. When dry, there is no fear of curling, only a slight curvature, and they are best stored in books having strong cardboard leaves. In printing from film negatives the frames will require fitting with pieces of plain glass.

Photo by M. J. Harding.
THE MILLER.

The most difficult point to get over was the question of holding them flat in the camera. With two metal carriers for each slide, the weight remained about the same as when using glass plates, and millboard was but little better, the advantage of the light celluloid being just outbalanced. To avoid this, I at last hit upon the expedient of utilizing sheet cork, and being an old entomologist, I hunted up some pieces used for lining insect boxes, which proved to be just the right thickness. After cutting to the 3¼ inch square shape, I glued a sheet of very thin card upon one side only of each piece of cork, and left two opposite ends of the card projecting a bare eighth of an inch, these being folded over flat and all finished off with a double coat of dead black varnish. In filling the slides, a film is put in face downward, then the cork division with the overlapping card edges uppermost, into which the second film is slipped face upward, the slight curvature keeping it in position, and the slide is then readily shut down and fastened when the film will be found to lie perfectly flat and in correct register. Slides in which the metal division is hinged, would, of course, require this to be first removed. There are special makes of film slides now in the market requiring no such contrivance as I have described; but those having the old forms of double-backs will find it very convenient to adopt my suggestion for carrying films, the weight being so slight that it is difficult to realize that the slides are really charged.

When it is remembered that a gross of films will pack in the space of two packages of plates, and weigh less, and that the quality of the films is now all that can be desired, there being no practical difference in the working between them and plates, and no risk of breakage, it seems more than probable that as their virtues become better known, the demand for celluloid films will advance by leaps and bounds, enabling the maker to offer them on equal terms with glass plates.

THE SOLUBILITY OF CHLORIDE, BROMIDE AND IODIDE OF SILVER IN VARIOUS SOLUTIONS.

By Edward Valenta, Vienna, Austria.

THE solubility of the silver haloid compounds in different solutions has often been the subject of elaborate investigation; but it is to be regretted that just those data, which have reference to the dissolving power of the so-called fixing mediums for chloride, bromide and iodide of silver, are missing, which data would be of considerable importance in estimating the efficiency of these various fixing mediums. For this reason, I have been induced to make extended experiments on the fixing power of a number of substances for the silver haloid compounds. Another inducement was that the equations (representing the action of sodium thiosulphate, sulphocyanide salts, etc.) give reason to believe that the solubilities differ with chloride, bromide and iodide of silver, which supposition is actually the case. I have included in my experiments in this direction, sodium thiosulphate (hyposulphite), sodium sulphite, ammonium thiosulphate, ammonium sulphite, ammonium carbonate, ammonia, potassium cyanide, potassium sulphocyanide, ammonium sulphocyanide, calcium sulphocyanide, barium sulphocyanide, aluminium sulphocyanide, and the recently recommended fixing agents thiocarbamide and thiosinamin. The results of these experiments are given in the following table:

SOLVENT.	Strength.	100 grams Solution will dissolve in grams.			REMARKS.
		Ag Cl	Ag Br	Ag I	
Sodium Thiosulphate........	1:100	0.40	0.35	0.03	The determinations were made at 20° C.
" "	5:100	2.00	1 90	0.15	
" "	10:100	4.10	3.50	0.30	
" "	15:100	5.50	4.20	0.40	
" "	20:100	6.10	5.80	0.60	
Ammonium Thiosulphate..	1:100	0.57	—	—	For bromide and iodide of silver the result was the same dissolving power as with sodium thiosulphate.
" " ..	5:100	1.32	—	—	
" " ..	10:100	3.92	—	—	
Sodium Sulphite..............	10:100	0.44	0.04	0 01	25° C.
" "	20:100	0.95	0.08	0.02	
Ammonium Sulphite.........	10:100	traces	traces	traces	
Ammonium Carbonate......	10:100	0.05	—	—	
Ammonia........................	3 per cent	1.40	—	—	
"	15 "	7.58	—	—	
Magnesium Chloride.........	50:100	0 50	—	—	
Potassium Cyanide...........	5:100	2.75	6.55	8.23	25° C.
Ammonium Sulphocyanide	5:100	0.08	0.21	0 02	20° C.
" "	10:100	0.54	2.04	0.08	
" "	15:100	2.88	5.30	0.13	
Potassium Sulphocyanide..	10:100	0.11	0.73	—	25° C.
Calcium " ..	10:100	0.15	0.53	0.03	
Barium " ..	10:100	0.20	0.35	0.02	
Aluminium " ..	10:100	2.02	4.50	0.02	
Thiocarbamide.................	10:100	0.83	1.87	0.79	25° C.
Thiosinamin....................	1:100	0.40	0.08	0.008	
"	5:100	1.90	0.35	0.05	
"	10:100	3.90	0.72	0.09	

The figures in the above table show that the dissolving power of sodium thiosulphate (hypo) for chloride, bromide and iodide of silver is very different. This does not correspond with the figures which can be calculated from the equations representing the action.

$$3Na_2S_2O_3 + AgCl(Br, I) = Ag_2S_2O_3 . 2Na_2S_2O_3 + 2NaCl(Br, I).$$

Silver iodide will change only to a small extent into a soluble double salt with sodium thiosulphate. Solutions of this latter are therefore only capable of dissolving the one-tenth part of silver iodide as compared with chloride and bromide of silver, for which two compounds its dissolving power is about the same. These results agree with those met with in practice.

Analogous in behavior to sodium thiosulphate is ammonium thiosulphate. The latter offers no advantages in comparison with hypo. (Labarre, *Photo. Archiv.* 1892, page 374.) The greater solubility of the ammonium salt in water is no great consideration when the great solubility of hypo is remembered. Even pure ammonium thiosulphate is always slightly decomposed.

Sodium sulphite is a pretty good dissolving medium for silver chloride if it is used in concentrated solution, but is ten times less effective than hypo. Bromide and iodide of silver are dissolved in only small traces.

Ammonium sulphite is less efficient than sodium sulphite; ammonium carbonate is also a bad dissolving medium for the silver haloid salts.

Regarding the dissolving power of liquid ammonia, the results of my experiments agree with those of Pohl, Hager, and others. Ammonia is therefore a good dissolving medium for chloride of silver. As a fixing medium for ordinary photographic purposes it is not applicable, for, aside from its penetrating odor, in concentrated solution, where it is most effective, it will attack the sensitive films of papers and plates.

Magnesium chloride was recommended by Liesegang as a fixing medium for chloride of silver films. As shown by the table, the dissolving power of this substance for silver chloride, when compared with that of hypo, is so small that magnesium chloride cannot be considered a good solvent, at least not for practical photographic purposes.

Potassium cyanide is probably the most powerful solvent and deserves much more consideration on account of its ability to dissolve, not only chloride, but the bromide and iodide of silver. It is interesting that the equations representing the action of potassium cyanide on the silver haloid salts, give no clew to the actual results obtained by experiment.

$$2KCN + AgCl(Br, I) = KCNAgCN + KCl(Br, I).$$

The action of potassium cyanide is the opposite of that of hypo. While with the latter the dissolving power for chloride, bromide and iodide of silver decreases toward the last named, it increases in the same rotation with the potassium cyanide, which possesses the greatest dissolving power for iodide of silver and the least for silver chloride. Cyanide of potassium is therefore the best fixing medium for films containing silver iodide.

The sulphocyanides dissolve the silver haloid compounds according to the following equation:

$$KCNS + AgCl(Br, I) = AgCNS + KCl(Br, I).$$
$$AgCNS + KCNS = KCNS.AgCNS.$$

As will be seen by the table, iodide of silver is dissolved only to a very small extent, the greatest dissolving power being for bromide of silver. Very dilute solutions of the sulphocyanides dissolve but little of the haloid salts, the excess of water causing a precipitation of silver sulphocyanide.

Of the most recently recommended fixing agents, thiosinamin and thiocarbamide deserve consideration. The latter is a very moderate dissolving medium for the silver haloid salts and will never be of any importance. Thiosinamin, however, is a very good solvent for silver chloride; in fact, it is about equal in power to hypo, but for bromide and iodide of silver it is far inferior to this substance.

THE PHOTOGRAPHER'S AIM.

By M. W. Thompstone, Manchester, England.

IN comparing photographs of the past with those produced at the present day, we are struck with the difference in the subjects represented, and the end which each has endeavored to attain. Those of the past give us some object or place, famed either for its beauty or historical interest, very often a mere representation of the same with slight claim to be considered a picture; whereas, at the present day, a photograph is very little thought of, unless it can show some knowledge of the rules of art on the part of its producer, and we can point to some, pictures in every sense of the word, that have been made out of bits of scenery that nine out of every ten photographers would pass by as of no account.

It must not be thought from the above that I wish for one minute to protest against those old historical and famous places still being photographed, for most of us like to have one or two views of such places as Haddon Hall, Stratford-on-Avon, etc.; what memories they bring back, what pride we feel at having obtained some pretty memento of these relics of bygone times, the pleasure with which we show them to our friends, and recount some little stratagem whereby we have been enabled to obtain a different view or effect from those purchased in the ordinary way; but, to the wholesale exposure of plates that goes on at the present day, without any aim or reason, such a course benefits no one except the manufacturer of dry plates.

The cheapness of dry plates at the present time has, no doubt, had a good deal to do with the position attained by photography; but, on the other hand, it has caused it to be held in some disrepute on account of the birth of that odious individual "the snap-shotter," who has no regard for any one or anything, and no more claim to be considered a photographer than a mere mechanical painter has to be considered an artist.

Hand camera work is all very well in its way, and, with certain aims in view, may be of use where an ordinary camera could not be utilized; but here again we find very few who really devote their time to producing pictures, the majority being content with a very much lower standard of results that are not worth the trouble of keeping.

Turning now to the ordinary camera worker, we still find a large percentage who have no aim in view, and whose work shows subjects repeated over and over again, with hardly any difference except the locality, and sometimes minus even that. Now how much more interesting would they have been if some object had been sought after, some idea illustrated, and if such was not obtainable, then left alone.

An artist before commencing to paint a picture, settles what it is to be; if a landscape, he studies it under various conditions of light and shade, the position from which it looks its best, and having satisfied himself, proceeds to place it on canvas; a photographer, if he wishes to produce pictures, must do the same.

It may be urged that the general body of photographers have not the time to devote this attention to each picture; then I say, better have fewer pictures, with something from an artist's point of view, than a mass of negatives having no connection with each other and of no value pictorially. A few yards either to the right or the left will very often make a great improvement; but how often do we see the camera placed on the stand, the view focused, plate exposed, all in a few minutes, without a moment's consideration as to whether that is the best place.

Therefore, never expose a plate without some aim in view. If it is a tour you wish to illustrate, endeavor to obtain the best views for your purpose; don't be led away by he first pretty bit you come across, or you may be disappointed before the day is out; always bear in mind that some subjects are not suitable, and do not appear to advantage in a photograph.

Suggestions for pictures you may very often obtain from poems, such as "The Deserted Village," "The Stately Homes of England," besides many good prose works. Many very beautiful results have been produced from the simplest materials, an ordinary pool with rushes growing in it, a bit of moorland or seashore, by watching the effect of light and shade, and seizing them at the best moment.

The more you try to attain some object, the more interesting your work will become, and, instead of giving it up in disgust, you will become more fascinated with it day by day, and will say, in the words of the old song:

"O'er mead and river,
Country side and town,
I roam forever
With my *camera brown*."

LECTURE SLIDES.

By H. H. Williams, Simeon, Va.

SOME years ago my friend, the Rev. G. H. Smith (who had been for many years a missionary in Madagascar, for the S. P. G.), asked me could I make him lantern slides from a series of native paintings on calico. They showed different phases of life in Madagascar, and were mostly done in green, orange and brown. Color plates were not on the market, and I had a great deal of trouble to get good results. My first trouble was that the calico was thin and semi-transparent, and the whites would not come out right.

This I got over by stretching a very white sheet tightly on a frame, and then pinning the picture on to it. My greatest trouble was with a picture of native football. (I may remark they don't kick a ball, but *each other!*) The place they were playing on was partly dark green, and partly yellow, the bare arms and legs of the players, red brown. Was not this nice, with ordinary plates? Plate after plate did I waste, but not one with any contrast. At last a bright idea struck me—rub the ground over with white chalk, this succeeded, and I got a fairly good negative.

I used a six inch lens and about a yard of magnesium ribbon burned a little in the rear of the camera. Many of the slides were on chloride plates, as by this means I could get in the portraits nearly the color of the original.

Soon afterward Mr. Smith had some photos sent him from Madagascar; these I copied as well, and managed to make what I was told was the most complete set of slides of that little-known island. I believe this set is still doing duty as one of the lecture sets of the Society for the Propagation of the Gospel in Foreign Parts, in England. Another set that I had a little to do with the making of is a hand drawn set of "Hookey Beak, the Raven," forty-eight in all. These are traced on glass direct from the book. The glass is first varnished with a hard *tough* varnish, and the drawing made *as soon afterward as possible* with Indian ink rubbed in ordinary writing ink. It is quite possible to draw directly on to the glass by putting gum into the ink, but we found that, taking all things into consideration, the varnished glass was the simplest.

Slides are often wanted of simple diagrams, and many a little outlined picture is seen that one would like a slide of, but does not want the trouble of first making a negative and then printing a slide, let alone the difficulty of getting jet black and clear glass. A set of these black-and-white pictures are most useful when giving a show in out-of-the-way places. If you find your audience getting tired of your lecture and the beautiful photos, just drop a black-and-white comic in, *as if by accident*, and you will get their attention again and often make a success of what might have been a failure.

A new "dissolving" slide was once shown at a public meeting of the Birkenhead Photographic Society, and it did astonish all beholders. It had been given out that a portrait of the chairman would be taken by magnesium light, and a slide from it shown on the screen. This was done amid great applause. The quiet voice of the chairman was then heard saying: "The chairman looks very pale, I fear he won't live till another year." He had hardly finished speaking when a curious motion was observed in the hands of the picture, *they moved upward.* Then the expanse of white shirt front also showed signs of life, the audience got very quiet, it looked uncanny, people wondered what next. Now the shoulders began to rise in a most wonderful manner, and the face showed signs of motion. Finally the shoulders rose clear over the head, amid roars of laughter from the company, and the whole picture became a mass of twisting lines. There being no time to dry the slide, it had been put in damp and had melted. Any reader who wishes to make a sensation, go and do likewise.

A HINT ON LANTERN LECTURES.

By Joseph Carroll, M. B., D. P. H., Ilkeston, England.

I HAVE frequently been struck by the variety of slides shown at these lantern evenings. Everything, "from a needle to an anchor," is included. The subjects on which lectures, illustrated by lantern slides, have been, or might be, delivered are almost as numerous as the stars in the firmament. Some subjects, of course, lend themselves to such treatment better than others, but my experience is that it is mostly the *man* who is to blame if the lecture is not a success. People, especially in the country, will go to such lectures readily, and are generally lenient enough critics.

One sometimes has amusing experiences at such lectures. Some time ago I was asked to give a lecture in an out-of-the-way Derbyshire village. There being no gas in the village, my lanternist friend took an oil lantern instead of his usual oxyhydrogen one. If either of us had any small lurking feeling of regard for the oil lantern, this one dose cured us. It is a case of "never no more." About half way through the lecture, the lantern began to smoke like a young volcano, and no amount of "faking" would abate the nuisance. The smoke was so dense, I apologized on behalf of the lantern, and hoped there would be gas in the village before another lantern lecture was attempted. One young man, evidently a bit of a wag in his way, called out: "Never mind, mister. Go on. Shall I go for t' swipe?" This put the audience in a good humor, and we struggled on gallantly to the close. Since then we have had lantern lectures, but not with the *oil* lantern.

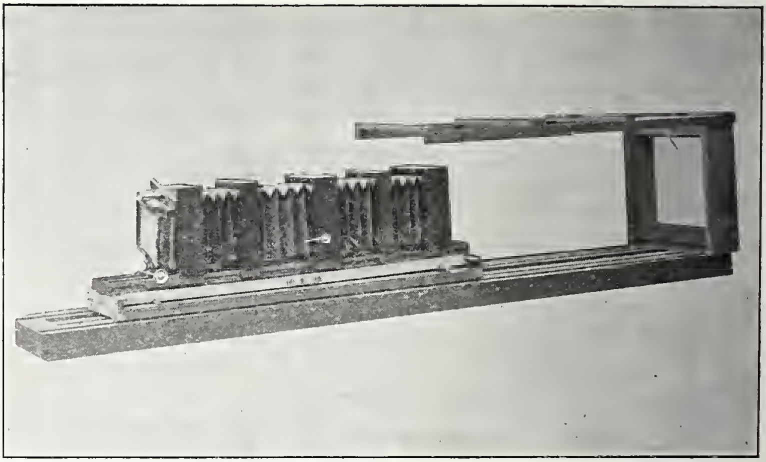
In giving a lantern evening, it seems to me a mistake to have a heterogeneous collection of slides with nothing in common. It is a much better plan to have the slides all referring to one district, one holiday, or one scientific or other subject. Jumping about from one subject to another is not satisfactory to the listeners. The lecture should be carefully planned and carefully written. Mark the points where the slides are to be changed. This prevents confusion.

Another point of importance is the delivery. Bad delivery spoils the best of lectures. Let the lecturer speak to his audience in a clear, distinct, properly modulated voice. It is surprising how such a voice carries to the uttermost corners of a hall, and is more clearly heard than louder speaking less distinctly pronounced. Let him avoid running the words together, or speaking to his boots. There is no necessity to shout. Clear, crisp pronunciation of terse, simple sentences is the method of delivery which is most effective. Long, involved and complicated sentences are altogether out of place in such lectures. They had better be left for the use of politicians, whose platform utterances are *not always* meant to be understood. Ambiguity should find no place in lantern lectures.

APPARATUS FOR COPYING AND MAKING LANTERN SLIDES.

By A. L. Eidemiller, Minneapolis, Minn.

A GREAT many amateurs are deterred from doing copying and making lantern slides on account of the trouble in getting their ordinary camera ready when they have no special apparatus for the purpose, and, when makeshift appliances are used, the results do not always pay for the time and trouble expended. I have seen the description of several contrivances for this purpose, but they were either too frail and uncertain in their movements, or lacked some essential features. Having done considerable copying and lantern



slidework, I had an idea of about what kind of an apparatus I would want, and constructed one accordingly. The cut shows the general appearance of it when ready for work. It can be used on an ordinary table, and hung on the wall out of the way when not in use, or, where floor space is of no consideration, it could be fitted with legs.

It is constructed entirely of well seasoned cherry. The base is made similar to the bed of a large portrait camera, and has a rail in the center running the entire length; this is shaped like an inverted L, and its purpose is to keep the carriage in place. The side rails of the bed are each provided with a "V," and it is on these that the carriage moves to and from the negative. The carriage consists first of a board thirty inches long by nine inches wide. This is also provided with "V's" on the upper surface, but at right angles to those

NEGATIVE BY H. CRISP ENGRAVED BY ELECTRO-LIGHT ENGRAVING CO.

TOP OF LAL LAL FALLS, NEAR BALLARAT, AUSTRALIA

on the bed. The camera is attached to another board thirty inches long and six inches wide, which has a transverse motion of three inches across the first board.

In selecting a camera for the purpose, I could find nothing better than Anthony's lantern slide camera. This gives a bellows extension of thirty inches, by placing the lens in the front end.

On one end of the base is screwed a frame to hold the negative. The front has a rebate for a ground-glass, and the back is grooved to take the kits. The largest kit is 8x10 inside and 11x11 outside, and being square, it can be reversed to accommodate either a vertical or horizontal negative. It is provided with a friction spring, so that it will remain at any height, and can be changed with a touch. At the top of the negative holder is screwed a light frame over which the focusing cloth can be placed during exposure. When the apparatus is used for ordinary copying this frame can be lifted up out of the way. All sliding parts are provided with friction springs, which make set screws and clamps unnecessary.

LANTERN SLIDES.

By Joseph Cottier, Jersey City, N. J.

I PROPOSE to go over some generally neglected but fertile ground, the improvement of slides of questionable success. I mean, of course, slides in which the poor result is due to the negative, for otherwise it will be far easier to remake the slide.

The general advice given by experts is not to try to make a lantern slide from a poor negative, but to take the negative over again. It is very good advice for such as can follow it, but most amateurs, having very little time to devote to photography in the daytime, find it hard to duplicate an unsuccessful negative, however much a lantern slide of the subject may be desired.

A very common disease of negatives is "weakness" and general debility, although plenty of detail exists; the plate has probably been over exposed and under developed.

If of the right size for a contact print, a very presentable slide can be made in the following manner: Make two slides, as nearly duplicates as possible; develop to get all the detail, but stop development before there is the slightest fog in the high lights.

If the development has been judicious, you now have two nearly similar slides, clear, but not more than half the required density.

Select that slide which has the more correctly placed image, and number it No. 1; call the second No. 2. Place No. 1, film up, on a piece of ground-glass so placed that the light passes up through it; place No. 2, also film up, on No. 1, so that the pictures will register as you look through; No. 2 will have to be trimmed on two edges, as two of these will project beyond No. 1. Trim a trifle more than is just sufficient. Mat No. 1, on the film side, and fasten the mat in position by paste or mucilage; care must be taken that when No. 2 is placed on No. 1, and registered, the trimmed edge of the former does not show inside the mat. As soon as the paste has set, and the mat is firmly fixed to No. 1, place this slide on the previously mentioned ground-glass, film up, wet the outer edges of the mat with mucilage, and place No. 2, also film up, on the first slide, being careful that the two images register exactly, as you look through in a direction perpendicular to the plane of the slides. When it has firmly set in this position, cover the whole with an ordinary cover glass and mount.

The result will be a compound slide, consisting of two films of the same thing separated by one thickness of glass, and accurately registering, and of a cover glass. When put in the lantern, No. 1, nearer the lens, will be in focus on the screen; No. 2, a little further off, will not be quite in focus, and its main object is to screen off some of the light from those portions of the first film, which would otherwise receive too much.

If the slides were separately only one-half the necessary density, the resultant picture will show up to perfection, and will, moreover, have extra softness, due to the influence of the back film, which, however, does not blur the image, owing to its being slightly out of focus.

Besides the negative which is too weak, there is the negative which is too dense in parts, giving blank spaces in an otherwise good slide; this is notably the case when there are mountains in the distance or sun rays striking through the foliage.

This evil can be counteracted by retouching with pencil directly on the film, and it is wonderful how little noticeable the pencil marks are on the screen, even when attention is called to it and the work is the work of a tyro, providing the effects have been produced by stippling or short strokes of the pencil and not by long strokes.

I had considerable difficulty in getting the necessary "tooth" with a preparation that had been sold to me for the purpose, and not having time to go to New York to get some retouching fluid from a more reliable dealer, I experimented with the following method, and have had such success that I counsel a trial thereof by those who may not have been successful with the old method. Naturally, it is of as much value for negatives as for slides.

The plate should preferably have been soaked in alum, or some other hardening solution. Now pour a little heap of any hard, finely powdered substance on the plate, and with the finger or with a pad, rub it over the film, with a slight circular motion, so as to thoroughly roughen the same. As soon as an even mat surface has been obtained, and the powder dusted off, the plate will take even the hardest pencil with great avidity. As to the powder, I have tried flour emery, but find it to cut too much, and now use firebrick, which has been finely powdered in a mortar.

Of course in this state the slide is unfit for use, for on the screen the scratches would show up like trenches; but to eradicate these, and at the same time fix the pencil marks, simply requires the flowing over the film of some good negative varnish or similar concoction, and the scratches vanish before its advance like magic.

About the other methods of improving lantern slides I will not have much to say.

The practice of printing clouds on the cover glass, and mounting the slide and cover film to film, in order to put clouds in a cloudless sky, is very good, if you do not put sunlit clouds in a sunless landscape, or *vice versa*; nor put clouds lit from the east in a country scene lit from the west.

Intensification is generally not very profitable unless not much is necessary, in which case good results can be obtained by immersing a well washed slide in a solution of mercuric chloride until bleached, washing and leaving for some hours in a solution of gold chloride; the resulting plate, besides being intensified, will have changed tone and be of a blue color exceedingly pleasant to the eye.

Reducing solutions are useful for local application, such as clearing up the sky or bringing out the high lights. For this purpose, in a small beaker mix a solution of hypo with a little red prussiate of potash. Taking the still wet plate in the left hand, dip one or two fingers of the right in the reducing solution, and rub them on the spot which needs reducing. Care must be taken to keep the fingers constantly in motion on the plate, and to dip this latter under a tap of running water every now and then, to prevent the solution from getting hold where it is not wanted. When the sky is slightly overcast and needs reducing, hold the plate so that the solution will flow away across the sky and not across the picture. Do not approach the outlines of the picture until the central portion of the sky is entirely reduced out. Then gradually approach nearer and nearer to the edges of the image, until finally some of the solution is rubbed on the picture; now watch carefully and at a certain instant it will be found that the sky has completely vanished, although the picture proper has apparently not yet suffered at all; thrust the plate quickly under the tap, to arrest reduction, and then treat the next portion of the sky. After the operation is finished the plate should be well washed in running water.

ANOTHER PHOTOGRAPHERS' PARADISE, NOVA SCOTIA AND CAPE BRETON.

By C. Emil Rönne, Philadelphia, Pa.

WE often hear photographic enthusiasts speaking of the Paradise for photographers, so even at this late hour I should like to be enrolled among these same enthusiasts, as I have just returned from sea, lake and landscapes so fair, beyond the borders of Uncle Sam's jurisdiction. In Nova Scotia and Cape Breton, I found this photographer's Paradise.

The trip from Philadelphia to Nova Scotia is full of interesting sights and incidents for the hand camera chap, who can resist the temptation of becoming a mere "Button-Snapper," and thereby make sure failures. The first and most indispensable article to get before starting, is a good hand camera, fitted with a first-class R. R. lens and shutter. The camera, in my opinion, must be an enclosed one, not of the so-called folding variety, as when you wish to "take" a subject, in a crowded street, for instance, you do not want to advertise the fact to surrounding curious people.

I use glass plates, my box is a 4x5, carries six plates, all I find necessary, for ordinary times, until I can reach my valise, in which I keep six more loaded holders, two or more dozen fresh plates (lots in my trunk) folding candle ruby lamp and brush, etc. Besides, my kit includes a light tripod, so useful at times when a studied landscape is wanted.

From Philadelphia to New York, on the reliable Pennsylvania railroad, in time to catch one of those floating palaces of the Fall River line (the *Priscilla*, preferred, being the latest). Arriving on board an hour or two before leaving, gave me time to catch several interesting groups listening to the band on deck. Leaving New York during the late afternoon, and after a most pleasant evening and good night's rest, we arrived in Fall River in the early morning; a fast train takes me to Boston, where, after breakfast, and a ride in one of those famous herdics, I am on board the steamship *Halifax*, with time then to look about for chances to "take" something *en passant*, while waiting for the starting hour, 12 noon.

Seated on the after-deck, numerous craft, passing to and fro in Boston harbor, find themselves imprinted upon my plates: for instance, schooners working their way in and out of docks, some bound for the open sea, as was United States ship *Atalanta* that day; likewise curious scenes on the gangplank, among others a bridal couple pursued by well meaning friends with showers of rice and other groceries, etc., etc.

At last we move out, turn, and with full speed ahead shoot past all manner of sea boats, from yachts to coal barges, some quite interesting enough to join the other "takes." Further on we pass Boston Light quite near enough to catch it—then dinner being *en règle*, we join the throng below, and see the queer sights, wishing there was more light to "take" some of those unfortunate people who are struggling with "mal de mer."

After dinner, once more on deck; land fast disappearing, and one is compelled to settle down and let the shutter rest. We see sails, but too far away for our purpose, so we give ourself time to take up the interesting book, which up to now has hardly been opened.

The trip in pleasant weather from Boston to Halifax, N. S., is exceedingly enjoyable. After one night at sea, in quite comfortable staterooms, and when the morning meal is over, we sight our first land, Cape Sable, not far from Yarmouth; then the weather being fine, Captain Pye goes as near the coast as possible, so as to allow his passengers to enjoy the view, about five miles off shore. Then commences the best part of the journey. We sight in turn, Barrington, Lockport, Liverpool, etc., etc., reaching Cape Sambro toward 4 P. M., and after passing inside the automatic buoy, we alter our course, turning nearly at right angles and enter the most magnificent harbor in Canada, if not on the whole American continent. We pass Chebucto Head on our left, Thrum Cape on our right, then York Redoubt and Meagher's Beach, on Macnab's Island, in the same order.

Now it is that this gorgeous scene appeals to us most, and we realize what a stronghold the British have established here in Halifax. Forts without number appear on all sides, George's Island, Fort Clarence and the Citadel, towering above the city, being the most formidable.

A glimpse of the North West Arm, and of Point Pleasant Park, and we are at the dock; soon in the hands of her majesty's customhouse officials, who collect from camera holders a small deposit fee, as a guarantee we will not sell our boxes in Canada. "Sell them!" we came to use them. We are now let loose among the renowned

"Halifax Hackmen," and after a "pulling about," we are induced to mount into one of their " barouches," a high-sounding name; still the sight of one is well worth coming a long way to be satisfied; where they came from, or how old they are, not the oldest inhabitant knows.

Good hotels are here, however. Meinherr Hesslein's well appointed "Halifax Hotel," where good accommodation and polite attention to strangers' wants impresses one greatly, and I must remark, one gets the utmost civility all over Nova Scotia.

The next morning we visit the city, with camera well loaded, having had a great time the evening before, blocking transoms with traveling rugs, etc. The first "object" that strikes our gaze, and our plates, "Tommy Atkins," her majesty's soldier, who with spick and span red-coated uniform, white gloves, cane (2 feet long), and hat over on one ear, makes a splendid appearance. Click, click, and several "takes " are added to my collection.

To describe the city of Halifax fully would take volumes, so I must refer you, whom I hope will take this trip some time, to the many guide books. The best views to get of the city are from the citadel, from which the harbor is simply magnificent. Here a tripod is necessary, and a larger camera could be used to do full justice to what shows up on your ground-glass. For naval views of British men-o'-war Halifax cannot be surpassed, as there are always several in port during the summer months. The views about the city are, beyond doubt, beautiful, and all photographers will surely agree with me. Taking a walk through Point Pleasant Park, you will find combinations of sea and land, which you will "take" until your plates give out. The scenery about Bedford Basin, and the Prince's Lodge, must not be overlooked. Likewise harbor views from Macnab's Island. Get a boat from City Slip, and, with lunch and camera, you will have a delightful day, even should you be friendless.

Then there is the North West Arm, that beautiful sheet of water on the other side of Halifax; drive to the Dingle and set up your tripod in the little summer house that crowns it, and you will be inspired on seeing the view below and before you. Another drive for interesting subjects of rocks and wild forests is to the Rocking Stone, a huge mass of solid rock of several hundred tons, which is so curiously placed that a child can move it. The lake view from the top of the "stone" is well worth coming so far to "take."

For sea and surf views, and curious fisher folks, a day journey, with single horse (the roads not being over smooth), to Herring and Portuguese Coves—this latter place is among rocks of the most picturesque kind, with surf breaking everywhere. For plain beach combinations with lakes, I strongly advise a trip to Cow Bay, about nine miles from Halifax, on the Dartmouth side. Here also can be found character shots, if one is persuasive with the good people down there.

Then the prize day for "photo shots" is Saturday, at the early morning market, where the peasant people come to sell their vegetables, meats, etc., etc. Besides these most picturesque people, dressed in their homespun clothes, there are the Mic Mac Indians, with their basket and fancy Indian work; also there are "colored gentry," from a village called Preston. The sight is really one not found every day, and I should advise photo friends to go there well provided in plates (in holders), as the supply will melt before one is aware of that most unfortunate occurrence, which is sure to happen when one's best "shot" is on hand.

I must speak of a little incident which occurred the day I went to the market. Close at hand is a government property, guarded, of course, by a sentry, and this day a very gorgeous one was on duty in full marching order, with knapsack, canteen, etc.; the temptation was too great, and rather than spoil a good subject by chancing it, I boldly asked him, pointing to my box, "Won't you give me a shot?" He looked rather confused and said, "Very sorry, sir, I haven't one about me." Great Scott," I replied, "I do not want a cartridge, but wish to take your picture," to which he said, much to my pleasure, "Certainly, sir," and, standing ten feet away, "at the shoulder," I filled my 4x5 plate with "Tommy Atkins," rewarding him with a cigar, and we both moved off, each pleased in our own particular way.

On going up the street I came across an old Indian woman, seated on the sidewalk, begging. The position, light, everything in fact so good, it was not to be missed; I hurriedly drew my slide, focused for 8 feet and set the shutter. Giving her a small fee, which she at once pocketed, she tendered her hand for more, when I was lucky enough to catch her in this position. (Both these negatives turned out beyond my expectations; the Indian woman is fine, if I may say so myself.)

A few more drives and a great many more exposures. In the public gardens I spent pleasant hours, and, I am glad to say, have been well repaid photographically.

Having heard for years past of the beauties of the Bras d'Or Lakes, in Cape Breton, I decided to visit them, and see what could be done with the camera, so one morning started on the Intercolonial railroad, and after a most pleasant ride through picturesque and wild country, abounding with lakes filled with lilies, beautiful mountainous landscapes, all going past too quickly to "shoot," we arrived toward 3 o'clock at Port Mulgrave, on the Straits of Canso, there boarding the steamship *Bluehill*, for St. Peters' canal—the entrance to the Bras d'Or Lakes.

Having a short time at Mulgrave, while the baggage was put on board, I took several interesting wharf scenes, men at work, shipping, etc., and last and not least, the beautiful Straits of Canso, with Port Hawkesbury on the other side. Enchanting, grand, is the scenery about this charming place, and too short was the time we had to enjoy it as we would have liked to, for soon we were off down the Strait, passing many small steamers and schooners, some of which were duly "recorded."

Toward 6 o'clock we went behind Isle Madame, and enjoyed a gorgeous sunset over the hills of Cape Breton, with splendid reflections on the water. About 7 o'clock we arrived at St. Peters', at the mouth of the canal, where we stopped for coal.

Here, again, I mourned the fact that it was not light enough to take the weird and picturesque scene now before me, which let me try to describe. On the right bank a few Indian birch bark wigwams lighted up by their fires, Indian women cooking the evening meal, and the full moon, high over the pine topped hills at the back, its magnificent rays reflecting upon the waters of the bay. My pen fails me to say more of the wild beauty this scene presented, and will leave it to my kind reader. At 8 o'clock we went through the canal, passing the high drawbridge, coming alongside of the steamship *Marion*, which is to take us through the lakes, and to Sydney, on the morrow. So getting on board the *Marion*, and putting ourselves into the good care of Mr. Mitchell, the obliging steward, we soon seek our staterooms, as I for one intend getting up to see the early start, and to lose nothing of the long sail.

About 5:30 the next morning I rose quickly, and going on deck, find we are about to get under weigh. The early light made the scene charming. At 6 o'clock we let go and are off. Now I am joined by other camera friends, and quite a party. We take a couple of shots at the steamship *Bluehill*, in foreground, with the bridge and the canal in the distance, though in the uncertain light we are not sure how these negatives will turn out (I hope our friend's came out as well as mine).

We were now on our route, and soon beautiful enchanting views, each more interesting than the other, are on all sides. A placid inland sea, with charming wooded islands, quaint farmhouses, quainter churches, and, high in the background, mountainous country, capped with gorgeous cloud effects. We can only gaze upon it all, as we fear to make more exposures owing to the poor light (now we all wish we had), and it was only when we reached Grand Narrows, that we woke up photographically to "record" the wonderful and costly bridge of the Intercolonial railroad crossing the lake at this point.

Still we steam on, after a short stop to let the Halifax morning train go by, and toward 10 o'clock we come in sight of Baddeck, that quaint Cape Breton town of which so much has been written, and renowned for the best oysters in Canada. On our right, way up among the hills, we see Professor Bell's (of telephone fame) handsome summer residence. We are too far from it to shoot, so we let it pass, with a mental plan, for later on in the day.

Coming into Baddeck harbor, and as we round the island before it, we take a shot at the town, including this island with its quaint lighthouse, and, to make the picture the prettier, we find we have also included the beautiful yacht *Coronet*, from New York, which was in the harbor; looking so well with its background, we take it again alone.

Another short stop at Baddeck, when some of our party go ashore, and "take" the principal street of this quaint old place.

Off again for the long run up the bay to Whycocomagh, nearly fifteen miles. Fine high hills, water scenes, chalk cliffs and gems of small islands, meet us again on both sides. One would have to have a stock house outfit of plates to appease our photographic appetite; as it is, one of our party of camera friends runs out of loaded holders, and has to resort to the old trick of refilling, half smothered under his traveling rug in his stateroom.

Toward noon we come to Whycocomagh, a picturesque, beautiful, quiet country village, just the place for real rest. Some of our passengers have found this out, and are going ashore for several weeks' stay; besides, sport of all kind is capital about here.

We take on board some fine sheep, the regulation black one among the lot; good chance "click," and they are "recorded," black one and all.

On leaving Whycocomagh, we are called to dinner, and we go reluctantly, though Mr. Mitchell's fare is very good, and the cool bracing air has given us an old-time appetite. Soon after, passing by again the same enchanting views, we reach Baddeck once more. Here we have a lively wharf scene, as a large steamer bound for Newfoundland is loading, etc. We also load up more cattle, this time oxen and cows, which refuse to get on board, and during the excitement I cannot resist "taking" the lot. Cattle stowed away and we are off once more. Here my mental plan is put into execution, and the captain is asked to pass as close as possible to Professor Bell's house, which he kindly does to oblige us. Mounted high near the pilot house, we wait until this really beautiful place is well on our left—click, and it is among the "others."

We pass near the towering cliffs, mostly wild and wooded to their summits. It is getting to be quite cool, so we huddle together and smoke the pipe of peace and comfort, keeping our eyes well open, however, as how could anyone feel drowsy amid such scenes of grandeur.

We arrive about 5 o'clock at New Campbellton, when we all jump up, and every man composing his own picture, fires away, some of them their last plate, mine my last but one, all regretting, when nearing the wharf, not to have more loaded holders, and no time to repeat the disappearing trick, to refill.

Grand is the view of water and mountain, the highest we have seen to-day. Picturesque is the scene, with the wharf and schooners, barges, loading with coal, etc., etc. We have to leave it all behind, and off we are, this time for Sydney, also for supper, to which Mr. Mitchell calls us. While at this meal we rush out several times to see the different northern capes of Cape Breton, as we are now at the end of this charming island. My last plate goes for some rocks, on the right, tipped by the setting sun, and once more we huddle together, with more pipes of comfort and peace, for the short ocean ride to Sydney. It is wonderfully smooth, so no thought of that "tired feeling."

The entrance to Sydney is well worth seeing, and we all enjoy it, expressing ourselves as "Glad we came," "Would not have missed that sail through the lakes, for a farm down east," etc. We make a short call at North Sydney, where the sheep are lifted on shore, as none would make the necessary start for the other ones to follow.

A five mile run across the harbor and we are at Sydney, where we find the town *en fête*, or such is its appearance, as the new hotel is lighted up with electric light, likewise a band-stand in front, where the band from the French man-o'-war *Naiade* is playing, perhaps to celebrate our arrival!

We are duly registered and washed at this hotel; then cigars being the order of the evening, we do a stroll about the streets, returning to hear the end of the concert. Yes, we are tired, the day has been a long one, and our senses have been at work since early morn, hence the reaction, so then to bed in this comfortable hotel; but "Change plates, my boy,'' is the word passed down the line. Well, I refill my holders, so as to start fresh on the morrow on the way home, as unfortunately my time is limited, and I cannot stop here a day or so, as I should like. Sydney is well worth a few days' stop, interesting old-time history spots, at Louisburgh, are also worth seeing. Then there are the coal mines, some of the largest in the world, at Sydney; all these, however, we had to miss—better luck next year, we said.

After a good night's rest, we all (that is our party) left by the early train for Point Tupper and Halifax. The ride is very beautiful to Point Tupper, passing many enchanting glimpses of the famous Bras d'Or, so well named, and never to be forgotten by us. At Grand Narrows we stop for breakfast, and to shoot a few more plates at the big bridge and the lake. Crossing this bridge, and after another charming ride, we reach Point Tupper, where we take the ferry to Mulgrave, also taking a few more pictures of the Straits of Canso. Having found our train, we are once more off to Halifax.

I will not bore the reader with a repetition of this journey, excepting to say there was a long stop at Truro, when we had time to go into the town and take a few shots at the pretty sleepy streets, and at some churches, etc.

Arriving near Bedford, we took good care to get a good view of this beautiful sheet of water and enjoy its sights, until we arrived at the depot, in Halifax, well on time shortly after 7 P. M.

Again do we put in a few more days in Halifax, remaining there long enough to see some of our pet views once more, before bidding adieu to the many kind friends we have made during our short visit.

So another fine morning, we step into Nova Scotia's best appointed train, the ''Flying Blue Nose,'' of the Windsor and Annapolis railroad, and start for our trip through the land of Evangeline, so world-famed.

Again the view of Bedford Basin from the rear car, again the ''rockyscapes'' of Windsor Junction, thence on to the town of Windsor. Here another bridal couple, with rice, etc., likewise a little click is heard. We know what happened.

Beautiful country everywhere, farms, orchards, etc. Over the bridge we roll, over the Avon river, all boats high and dry; tide here rises and falls about forty feet. Kentville is reached on time, having Cape Blomidon, across Minas Basin, in view during this whole trip, and we all long to come back here and settle down for photo work, no time now to stop off. North and South mountains loom up on both sides of us, and stay with us until Annapolis. We pass Grand Pre, getting a fleeting glance of what is known as Evangeline's Well.

Annapolis Royal, the oldest town in Nova Scotia, is reached in time for dinner. We have had ours upon the train, so we take the time to hunt up shots. At the end of the wharf the steamer is starting for St. John, N. B., so we "take" it, and another "take" joins our collection.

All on board, and we are off to Digby, around the Annapolis Basin.

My, what curves! what scenery! what water views! The train is speeding too much for photo work, so we can only look and fill our memory with such entrancing scenes. Still, the train slows up. I wonder what camera man has bribed the engineer. The entrance to the Basin is right opposite to us, Digby Cut. All hands run to the rear platform, and several plates are exposed—how many good negatives will result from this hurried composition time will tell.

Digby is one of the fairest spots in all Nova Scotia we have yet seen. I for one will return here next year, and Digby will have me for a guest. Everything is here for the photo tourist—water, land and mountainous country. Too short is the time to run out to catch some of these views, though several attempt it, to meet with calls from conductor.

The ride from Digby to Yarmouth is rather pretty, but did not strike me as being so interesting from a photographic standpoint, though sportsmen tell of the country being filled with game.

We reach Yarmouth toward 5 o'clock. Here is another town well worth a journey to see, especially for the camera man, for good surf, rocks, and wild scenery abound about here.

We go to the wharf and are soon on board the steamship *Yarmouth*, and make the acquaintance of Captain McGray, "right good captain, too," whose chief aim, after the safety of his passengers, is their utmost comfort, to which he sees personally. Supper, and we are off for Boston. Pleasant night on the water, not too rough, not too smooth, just right. Capital stateroom, capital night's rest. Fine morning, about 9 A. M. we see sails on all sides, we are approaching land, Cape Ann looms up, then by and by Boston Light.

Now is our chance, we get ready, and the Light is once more shot, with the addition of a schooner under full sail, to make the picture prettier. Yachts we pass many. I am fortunate to get a good vantage on a beauty, no time to read her name, only time to compose and expose.

At 11 o'clock we are at the pier. Here we feel the heat, of which we have not thought since three weeks. Well, custom house people, transfer agents and hurdics. Take one? Yes. Lunch. Drive about Boston to pass the time. Walk through the public gardens, take a couple of shots of the lake there. Six o'clock off to Fall River, there on board the *Priscilla.* Next morning at New York, thence home, per Pennsylvania railroad to Philadelphia.

You will perhaps ask, "Glad you went?" "Well, watch me next year." "Advise others to go?" "Read what I have scrawled, and decide, and I think you will affirmatively, or long to."

To those who will go, a few pointers. Be sure you get a good hand camera, good lens and shutter; use plates, they are better than films; you will not make so many exposures, perhaps, but you will think before you shoot, hence your successes will be more numerous.

Take a tripod and as many holders as you can conveniently carry, and have these, when loaded, in your grip, so as to be able to get at them quickly.

Take your favorite brand of plates with you, as you are not likely to find them down there, also do not forget a ruby folding candle lamp, with a sheet or two of post-office paper; I found that style of lamp the handiest.

The duty and deposit are very small, and the latter is returned when you are homeward bound, so do not let it enter into your large items of expense.

In conclusion, I might add that since my return I have developed all my plates, and I am glad to say they have averaged beyond my expectation, and I have a collection of "takes" you will pardon me for being proud of.

If you should ask me what developer I used, I will tell you, Metol. And plates? Well, Seed's gilt edge. Not a fogged one in the lot, and they carried finely, packed film to film, in their own boxes.

So ends my trip to this photographer's paradise, and, as I am not selfish, I give you my discovery, for you to go, do, and discover likewise.

REPUTATIONS.

By E. E. Weatherby, Plymouth, O.

THE professional photographer, if he has the true business spirit in connection with his artistic ability, is ever jealous of his reputation, and values it as far more than "stock in trade."

It is the one great incentive in his life that he works for, cherishes and nurtures as the mainstay or rather the foundation on which his future business structure is to be reared. And well he may, for whether or not it be well earned, if he can retain a high position among the craft, or in the particular community from which he expects to draw his trade, he need have no fears for his future.

There is very little chance, however, in this age of advancement for one to appear greater than he really is—for any length of time at least.

With the bravado and "brass" that characterizes the fool, he may flaunt to the winds his banners and streamers, so to speak, telling to the world what a wonderful fellow he is. But after a few years work, let us look at our friend again. If he has tried to buoy up a false reputation, no matter how auspicious the beginning may have been, he will find that the breakers of public sentiment and criticism are too severe, and his frail bark must go to pieces for lack of substantial proof that it ever had an existence. If, on the other hand, he has been energetic and alive to his every interest, he has taken each opportunity as it presented itself to build up a lasting reputation, not on braggadocio, but by good, honest business methods, and a genuine development of his artistic nature, which must make itself manifest in his work, as he steadily climbs toward the zenith of his ambition.

How pleasing to one who has devoted years to the careful study of his work, to see that his efforts for the advancement of his chosen profession are being appreciated, and feel that a solid, substantial reputation is being formed that will place him on an independent footing in the business world.

Should he be so unwise as to let his success make him careless, or "turn his head," as the saying is, he may stand for awhile, but merely "running on his reputation" has been the downfall of many a poor fellow who could not stand prosperity, and who either could not or would not continue to turn out work corresponding with his past efforts, which had won for him an enviable position in the artistic as well as the business world.

Flattery should not be heeded. Of course, we all have more or less pride in our make-up, and we cannot help "being pleased that our friends are appreciative, although they may over-estimate occasionally.

We know, or should know at least, just where we stand in the profession, and be able to judge whether or not our eulogistic friends are going beyond the bounds of legitimate praise.

Let us be ever mindful of our future, and not let honors—no matter how richly deserved—be an excuse for resting on our oars, thinking we are safe, but rather let them be an incentive to further research and study that we may press forward to still greater victories.

We perhaps too often overlook the little things in our hurry and hustle in this age of the world. This should not be, as we must give careful attention to all the minor details of our work, if we would succeed in the various undertakings that we venture upon day after day.

We cannot afford to become indifferent in this matter as our fate rests on whatever we do, no matter how insignificant it may seem at the time. This has been exemplified again and again when some ardent student in his profession has given to the world some new idea which he probably at first treated very indifferently.

Let us, therefore, see to it that our star of hope does not wane for lack of careful and patient study, knowing full well that only in this way can success be assured.

PHOTOGRAPHIC ECONOMY.

By E. K. Hough, Fredonia, N. Y.

WE have treatises on business economy, domestic economy, political economy, and various other economies, but no special treatise on photographic economy, and a few remarks on that phase of photography may not be out of place in your pages, treating as they do on every question relating to our business-art. The great aim and the main talk seems to be how to keep up the prices, as if that was the only question connected with profit.

In photography, as in most other forms of art, creative or decorative, the cost of labor is more than the cost of material. Many people in commenting on the value of photographs, calculate their cost on the basis once used by a lady I knew of, who, when estimating the value of an oil portrait, for which $50 was charged, exclaimed: "And I don't believe the paint and canvas cost a cent over $5. What an enormous profit!" I have heard scores of people judge the same way. "Just a bit of cardboard with a picture on it—why, they must make 500 per cent. profit." Judged that way, photographers do make an enormous percentage of profit, yet how few photographers ever get rich. Where is the failure? Do not photographers make a great mistake sometimes by the same rule? When they are getting high prices per dozen for cabinets—keeping up the price they call it—getting a large percentage of profit, they seem to think they are doing the best that can be done, although they may be growing poorer every year.

It is not the percentage of profit, but the volume of business that pays. It is not the amount made on one dozen or ten dozen, but the amount of clear profit on a year's business, that tells whether the business is paying or not.

It does not take an elaborate calculation to show that a photographer, who is taking eight or ten orders daily at $3 per dozen, is doing better and making more than one who takes only two or three orders a day at $5 a dozen.

The late improvements in dry plates and ready-prepared printing papers, by saving labor, have reduced the cost of production, which is equivalent to a raise of price where prices remain as before. But in many cases would not these improvements give a greater benefit by making a proportionate reduction of price and thus largely increasing the volume of business.

It is a sort of axiom in business that a decrease of 10 per cent. in cost will produce an increase of 50 per cent. in the consumption or demand.

If that rule will hold good in photography, it would be a guide to the best paying rates. As labor is the largest element in photographic cost, we will take what one man can do as the unit of cost. If in any given locality he has all he can well do at a given price, he is all right, and an increased volume of business by lower rates would be of no great advantage to him. But if he does not have half enough at high prices to occupy his time, then, in an economic sense, the most costly element in photographic production is going largely to waste.

I have a case in mind where two photographers were each charging $5 per dozen, in separate villages, though near together. They were about equal in reputation and skill. But as prices gradually fell, one reduced his price to $3, while the other held out at $5, and gradually the bulk of the business went to the $3 man, until, with increased business, he was able to improve his outfit and his accessories, thus giving him still more advantage, until it almost ruined the $5 man. Still the latter held out, and what the result would have been no one can know, for he died, and his place was taken by a young and comparatively inexperienced man, who made good average work, utilized the late improvements, and put his price equal with the other, and has gradually recovered an equal share of thetrade again.

Was he not wiser than his predecessor, who held out for high prices, driving the trade largely to his competitor?

The move for charging by the number of proofs made is a distinct and valuable economic movement, largely reducing the cost, or rather making the customer pay it, which gives the same economic result, and has the advantage of making it more possible for a large class to have pictures, because cheaper, from good galleries.

The new possibilities opened up by the electric light and the flash light, make new forms of enterprise in portraiture quite probable.

ENGRAVED BY MOSS ENGRAVING CO.

CHILD STUDY

BY MEACHAM & SABINE

Instead of waiting for people to come in, they can be taken at their homes and the pictures finished at a central gallery, with a corps of retouchers and all the facilities for finishing on a larger but more economic scale than when separate establishments, with all the facilities for finishing, must be maintained in each little village, either with inferior accommodations or at large proportionate expense.

If pictures can be made and printed by electric light, as claimed, then the best business will not be hampered by the worst light, as now, in the holiday season, but promises can be made with confidence, and deliveries on time be made with certainty. Portrait photography in the past has been practiced with wasteful extravagance; expensive methods must be replaced by economy. Materials can be saved, time more fully occupied, expenses curtailed and business increased by giving the customer a part of the benefit of wise economy. It is folly to look on high prices as the only means of getting greater profit.

We may maintain high prices and we may not. Only in exceptional cases can individuals obtain prices much higher than the average. But each one can do something in the way of lessening the cost of production, and that amounts to the same thing as getting higher prices, and this can be done to an extent far beyond what seems possible, often, and almost always, with increased prosperity from larger business. This economy is not to be obtained from penurious business management, but from a careful avoidance of needless waste, and such business calculation as keeps valuable time fully occupied, and avoids extravagance and needless expense. Let each one study his own circumstances, and see if he cannot add 10 or 20 or 50 per cent. to his yearly profits, and when that result is achieved, let him congratulate himself just as if he had obtained that much higher prices, and thereafter make the study of photographic economy a science.

PHOTOGRAPHIC PERIODICALS.

By A. C. I. D., New Jersey.

SINCE schoolboy days, when, as a privileged character, I was allowed to watch the village photographer perform his mystic ceremonies in the seclusion which the dark-room grants, I have been interested in photography. It was from the standpoint of an admirer only, however, until by chance, not "the usual way" exactly, a cheap hand camera came into my possession, and the latent fever developed immediately, with such intensity that nothing in the way of the usual failures could even check the progress of the case. They only led to a seeking for more light, and a consequent devouring of all the available literature. In the course of my reading, several seemingly weak spots in the literature have appeared, which mar their otherwise attractive *ensemble;* and I wish to make a few friendly criticisms in the hope that they may result in the toning up of the faulty work. Any observant reader must have been annoyed by the too evident results of crude and hasty work in nearly all the departments, and especially in the matter of proof-reading; although bad grammar, poorer rhetoric, and even worse spelling often vie with an incomprehensible plan of punctuation in putting a worse than chemical fog on some of the sentences. Picking up at random one of the worst offenders, we find in less than a column "ariel perspective," "molydic acid," "saturated solution of oxalic acid cold in water," "eiter" for liter, "eights" for eighths, "trken" for taken, "devided," "eunces," "multply." But these are among the least important of the offenses. Descriptions that do not describe, "illustrations" that appear to illustrate nothing, certainly not photography, and formulæ that have to be corrected in a subsequent issue, are altogether too prominent features. We should undoubtedly recognize the fact that it is easier to see mistakes than to avoid them, and that a large share of the editing is probably done by those whose time has prior claimants; but, for all that, we insist that the readers are entitled to more consideration and better gotten up papers than the average. I have received, and constantly do receive, much pleasure and valuable help from all the periodicals in question, and do not wish to rank as a grumbler; but I write in the hope of creating a desire on the part of the editors to remove from their work even the faintest suggestion of crudity. In the matter of illustrations, we do not expect that all can give us in each issue actual photographs, as do some publishers; but certainly we need not be annoyed with samples of the work of so-and-so, just to advertise said firm and fill the space. In the matter of formulæ they should at least be accurately given, and the kind of weights stated. In a word, all photographic literature should instruct or amuse, and do it correctly; but, unfortunately, some does but obstruct and confuse. Among the improvements for the coming year, let us have more "retouching" in the editorial room, even if some of it must be done with a blue pencil, in order to have more satisfactory results in the finished product.

PRINTING IN NATURAL COLORS.

By Macfarlane Anderson, Northport, Washington.

ADVANCES made in the last twelve months in tri-color printing methods in America, by typic block process, call for some attention at this time. Those employed in any of the art departments of the numerous publishing and printing establishments, and the managers and heads of such houses, are well aware of the necessity of acquiring some such knowledge of this new process as will be of future help in furthering their selection of the desired material and requisites required in the production of commercial work.

As a short practical treatise of the different operations and articles necessary to the obtaining of negatives, blocks, prints, etc., by this process will be more acceptable to the general reader than a discursively embellished article, it shall be my endeavor to attain this end.

Color Sensitive Plates.

Such subjects in color, as can be moved to the operating room for reproduction, should be photographed by the agency of the wet plate process. The collodion in this instance should be colored with chlorophyll or other suitable dye, the sensitized plate being used in conjunction with a proper screen. When the light or location is unsuitable and wet plate work an impossibility, a first-class highly sensitive gelatino-bromoiodide plate should be used. Such a plate is manufactured by the Record Company, and is sensitive to all colors. The color screen for red must absorb the proper color to do the work correctly. In this instance a screen of chrysoidin, very deep in color, will be found excellent for the purpose.

Those working outdoors in landscape work will find it to their advantage, and a passport relieving them from future annoyance, in making a trial proof exposure of the three printing pigments with each individual color screen. Whatever plate is selected, whether it be prepared by one's-self or an article of commerce, should give with correct color filters a set of blocks giving an exact reproduction in colors, when printed from, of the pigments on color charts which are used in the printing of our color work. It is only by actual proof in this manner that a worker can feel assured of success.

In reference to the above I would state that my experience with screens sold as perfect and truthful for reproducing color values, is that such screens, although good enough in rendering monochrome color values, are misleading, and not to be trusted for *photochromic* work. I find in actual work that it is a very difficult matter, and nearly an impossibility, to obtain truthful results with them.

The cause of this is not far to seek, when we remember that to obtain all colors of the spectrum in their tone values, three printing blocks must fill the demands. Any shortcomings of the color screens in failing to give the exact color values in their individual tonalities in each negative, will be the means of gigantic defects in color looming up in the resultant print.

As an illustration, we have in a landscape study the middle foreground in varied dark green foliage. Here, the dark emerald mantle of tamarack and fir contrasts vividly with the light yellowish greens of the sunlit foreground. In reproducing these secondary colors, their delicate shades and tints, we are dependent upon the individual tonalities of our yellow and blue printing blocks, obtained by the blue and red screens, respectively. The yellow printing block No. 1 (blue screen) will be found correct in most instances; the blue block, however (red screen), is another matter, and if the red rays have not acted with proportionate energy and force, to the total exclusion of the violet and green, the resulting picture will be so defective in the building up of the greens, that a mass of rusty jaundiced colors will take the place of nature's garb. This effect or defect is brought about by the preponderating power of the red printing block—green screen—the color tonalities of which throw those of the blue printing block into minor importance, whereas the blue should have been the principal factor in determining the desired effect.

It is such difficulties as these, encountered at the commencement of any original invention and inherent preliminary work, that supply temporary literary food for complaint from caviling writers, who are, in most cases, wholly ignorant of their subject.

It is therefore understood from the foregoing that to be successful in this work, the first requirement to start with as a foundation is:

Standard Colors.

These, to fulfill the demands of photochromic printing, must be absolutely pure, have a certain amount of solidity combined with transparency, and of suitable printing qualities. When printed over each other in solid shades, there must be solidity enough in the pigments to give black. The secondary and tertiary colors must be produced by the proper combining of these pigments. Any printing inks, in yellow, red and blue, will give a black when superimposed. The obtaining of colors and shades of the different orders, however, is a more difficult matter. It is here that much of the color work produced by this method to-day fails to give that satisfaction that most of us desire. Until suitable inks are used in connection with true color value negatives, publishers, operators and printers must expect failure.

To find standard pigments suitable for this work, has received some attention on my part of late. I may say that success has been attained in enlisting the services of a firm of notable ink manufacturers, and a reliable article can now be had by those engaged in this work. A trial with these inks shows solidity in obtaining depth and effect, still giving sufficient transparency and luminosity to render perfect every shade and color. The yellow I am especially pleased with. It is of such vigor and body that any shade of green is rendered in the superimposing of the blue. The same implies similarly to combinations of blue and red—purple—yellow and red—orange—also their respective combinations. Those working this process are aware of the difficulty in producing pure green; by putting themselves in communication with the Ault Wiborg Company, Cincinnati, they may rest assured of getting an article adapted to their work.

Color Screens or Filters,

as previously stated, must be made and proved by photographing the actual pigments used in printing the color work. When each negative obtained in this manner gives the true color value of the pigments, then the worker may consider his color screens correct. This method, so far as I am aware, is the only true and safe one up to the present, despite all talk of dye-stuffs, or plate sensitizers.

I think it is plainly perceivable in the determining of color filters by photographs of the spectrum by refraction, that such filters would give entirely different values when used on a sunlit landscape, the colors in this instance being obtained by reflection, also having a large amount of white light in combination. This theory also will be found wanting in practical work and inferior in its results when compared with the screens obtained in the manner as advocated.

Color Typic Blocks

must be made in the single diagonal line system, or the first printing, yellow, may be from a tint block; the second from a mechanical stipple plate. This will not conflict or diaper the third, which can be a simple cross line block. This, I believe, infringes no one's patent.

The very best results, however, will only be obtained in this work by a combination of single line and tint block, the printing blocks being four. I am led to make this statement from the fact that the three single line system shows too much white in the lighter shades of any color, which means in this case a weakness of image and outline in subjects containing a wealth of soft shades and tints. A system of printing such as this—tint and line—has received my attention for a lengthy period, and a photomechanical arrangement to give such a series of blocks, I believe, will be of important service in advancing this new color work.

In making transparencies from original landscape negatives in this triple color work, much can be done in heightening or subduing color effect by judicious work on the transparencies in washes of Chinese white on the glass side. A set of half-tone blocks can be entirely changed in character and quality in this manner. The shortcomings of defective color screens can be materially remedied in similar manner. In printing, always remember that the blue block is the master of the situation, when effect is desired.

THREE-COLOR OR MONOCHROME FOR ILLUSTRATIONS?

By W. I. Scandlin, Boston, Mass.

WITH the improvements of late years in the manipulation of the line screen for the production of printing plates, and the experiments that have been in progress during this same time in the working out of the three-color theory, we have been flooded with a class of illustrations which, it seems to me, reflect anything but credit on the artistic tastes and sensibilities of those responsible for their production, and are in no wise a compliment to the good judgment of the buying public, who are supposed to find in them an allurement toward purchasing the works in which they are contained.

That the half-tone relief plate, as it may be printed in three or four colors, has a legitimate field of usefulness, cannot be denied; but whether that field embraces works of art and the finer lines of scientific illustration, I believe to be a question admitting much room for doubt, and should take the ground that in a vast majority of cases such works would bear reproduction in monochrome, by any one of the several processes in the field to-day, with greater accuracy and fidelity to the original, and with far less cost to the publisher, than by any attempt at color interpretation under the limitations of the three-color theory, as it has been worked out, and further, that if it is essential to use color in the reproduction, it may be done with far greater advantage by the employment of lithographic stones or gelatine plates.

The impression seems to prevail in many minds that work produced from these half-tones may be obtained at a much less cost than by the older methods, and when comparisons are made of the results, this should be the case; facts, however, do not seem to bear out this supposition—at any rate in so much as the writer can ascertain. Leaving this phase of the question, however, and turning to the *results* obtainable, we find so many obstacles in the way of the practical application of this theory (which *theoretically* is full of possibilities), that it seems almost wicked to tax the process at its present infantile weakness with such heavy burdens as it is daily compelled to bear. Mr. Ives has very clearly demonstrated that if a subject, no matter how highly colored, is photographed in the proper manner, and the negatives projected at the angles suited to produce perfect register, through color filters which are chemically and optically pure and transparent, a wonderfully perfect reproduction will ensue; but neither he nor any one else has yet shown us how to produce printing pigments which in any way approach the necessary qualities of transparency and purity either optically or chemically, and until this is discovered, we cannot hope to accomplish much in the production of compound color effects by the superposition of primary colors. It is a demonstrated fact that the variation of 2 per cent. in the shade or tint of any color used will completely change the effect of the color reproduction where combined with other colors in the print, and it is easy to comprehend what a vast difference must result if any variation exists in the printing of these primaries, when the entire color scale is dependent on only three printings to produce *all* the shades and hues in their proper values, and no opportunity allowed, as is the case in true color printing, to compensate in a subsequent printing for any falling off in a previous one; and thus, while many good results have been obtained as proofs, the cost has been, in probably every case, far in excess of any possible commercial return, and the possibility of duplicating the proof impressions, in editions, would be slight, except at excessive outlay of time and labor.

The chemical properties of the pigments must also be considered, that decomposition and elemental changes do not occur after they are combined, which will of themselves at a later time completely alter the colors of the reproduction. In the monochrome print, however, if the same amount of attention is given to the making of a single negative, that in the other case must be given to each of three, a resulting print may be obtained which may be from either a half-tone block, a gelatine surface, or by other methods, which will convey to the sense of the observer an interpretation of the original into its photographic aspect, and if treated with the same skill necessary in the least successful color print, cannot but give a greater amount of pleasure to the eye of the ordinary student of art or science than the necessarily crude attempts at fac-simile reproductions with the limitations of three impressions only on the printing press.

A sufficient time has passed since this kind of work was introduced, and quite enough examples have been given to the public to show that in the higher field of art reproduction a noticeable lack of pure color values and delicate atmospheric grays is present, in even the best specimens of the work, while the necessary breaking up of the print into the lines caused by the screen, destroys much of the fine detail of the original. The eye soon tires of the monotony of these reproductions where the same color sensation is to be seen in portrait, landscape, seascape and interior, and turns with relief to the monochrome which translates in their *relative values*, the colors as they exist.

A careful comparison of the best specimens of each kind of reproduction will, I believe, substantiate my theory that a good monochrome reproduction is better calculated to bring credit and profit to its publisher in the long run, than the best possible three-color halftone print.

CAMPING IN SOUTHERN CALIFORNIA.

By C. A. Mackechnie, M.D., San Bernardino, Cal.

TO those fond of outdoor life, camping offers innumerable charms; the angler finds plenty of fish—if he is lucky; the shootist plenty of game, but to the amateur photographer the beauties of nature, and reminiscences of his outing, fill his heart with joy. It was recently the writer's pleasure to form a part of a small prospecting party among the Sierra Madre mountains of Southern California. It is needless to say that the weather was "just perfect," and of great assistance to forming a correct exposure. At this point let me warn any brother amateur that exposures here must be short, cap off and on quickly with smallest stop being about correct. If F. 16 or F. 22 be used a shutter is required.

We got our buggy loaded with all sorts of things, and proceeded to climb the hills. Though the scenery was grand and the air delightful, yet there were many parts where it was necessary to have a stout heart, because we were too near to the edge of a precipitous canyon. Some individual connected with the grading party had erected numerous posts on the road, containing a few words which helped to cheer the travelers on their weary climb. Late in the evening we struck camp in a beautiful valley, 7,500 feet above sea level. Next morning a memento of the valley was taken, and soon we were on our way. Our way led through a succession of valleys and small hills, until we came into the celebrated Bear Valley. After leaving Bear Valley, we saw evidences of gold in the shape of "prospect holes," and very soon came upon a large placer mine.

In camping out for a few days it is necessary to develop a trial plate to find the correct exposure; the remainder can be developed on the return home. If one remains longer than a week, all plates or films should be developed, as then one can rectify any wrong exposure by taking another photograph. It is not necessary to burden one's-self with a quantity of developing dishes, etc. The exercise of a little ingenuity will help one to turn out first-class negatives. In these expeditions I much prefer films to plates, on account of their weight and compactness. The lenses should be carefully protected, and of first-class quality. A telephoto lens should, by all means, be included in the outfit. Before using your outfit, every part should be carefully examined, as dust gets into everything and is productive of numerous pin-holes. Special attention should be given to the lens, as moisture is apt to form on the glass, thus interfering with the exposure. If the camera is a light one, special care should be taken in seeing that it is made as steady as possible.

CAUSE AND EFFECT.

By G. H. Loomis, Newtonville, Mass.

IN the practice and manipulation of no other business is there so many startling, astonishing and indescribable effects, from unknown and utterly inconceivable causes, as are furnished in the laboratory of the photographer whether he is professional or otherwise—especially if he is otherwise, and fairly capable of sensing the sublime and ridiculous, when he sees it. From the moment the chemical flow commences, till the washing, drying, varnishing, printing and toning is over, there is apt to be a succession of surprises, that would put "Pandora" to her wit's end, and wake up anew the oft recurring questions, What next? and why? The dissolving views of frost work on the window-panes is a delightful study, and many are the moments we have watched their witching tracery, so artistic and beautiful; but when we have attempted to develop a sensitized plate, and witnessed the marvelous and entirely unsolicited and unexpected results in the way of picturesque effects, we have pounded and puzzled our brain to know why and what for, this free display of chemical antics. Not long since, after selecting our choicest and most reliable super-excellent Stanley, and taking straight aim at our objective point, we pressed the button, and, while awaiting development, fancied we had secured a picturesque prize. We intended to catch a vine-clad cottage with a pretty lawn frontage, with central and side display of floral and fountain attractions, with a charming rose-embowered summer house, about which our friends the family had grouped—a fine combination of accessories; and we got—well, we got a negative that was positively astounding. If the plate had been exposed nineteen times on as many different objects, without being washed and recoated, it could hardly have given the "infinite variety" which greeted us on taking the plate from the fixing bath. Near the focal point, where we had placed a "sweet sixteen" and one or two prettily-clad juveniles, with racket and ball, there appeared a havoc incident to a dynamo explosion, with no lives lost, as what was noticeable in the expression of the victims indicated nothing but peace and placidity In another section of the plate appeared something like a dog fight, while a third view showed something of the scene upon which we concentrated our focal process. Hanging our plate up to dry we went to our camera obscura, and blowed through it to ascertain if ought was in it that would produce such kaleidoscopic effects; but it seemed clear from cap to ground-glass. We fished again in the hypo bath, thinking we might find another and the real negative, but no reward for our search, and we gave it up. If there is any reason in an unreasonable problem, it is that the plate was chemically bewitched, or that the developer was intoxicated, or that the lens was suffering from astigmatic conditions, or that the amateur operator was a victim to visual distortion, or perhaps delirium tremens; in fact, all of these disturbances appeared in the sum total of effects whatever may have been the causes. Some matter-of-fact reader and superficial thinker will imagine this picture overdrawn, but the negative referred to tells its own story. Speaking further of cause and effect, not long since we presided at the camera in photographing a somewhat attenuated and thin-featured young lady, and having made two or three exposures we proceeded to development, and with apparent satisfactory results. After the preliminary washing and cleansing, we placed the negatives in the draining and drying rack, where the direct sun rays could hasten their preparation for printing. Again we were confounded, on finding that this wan-face damsel was almost bursting with the mumps, as each cheek was swollen to its utmost tension, while the naturally elongated face had shortened up just in proportion to its abnormal width. Of course we could guess at the cause of this when considering the effect of undue heat of the film; but we didn't like to hazard an opinion for fear some one of a practical turn of mind would question our intelligence. Now all of us, especially the best of us, in the profession have had queer things occur, in the way of double exposures, and no exposures by reason of undrawn slides, and we venture to affirm that some of us have omitted or neglected due proportions in our various solutions, and found our most careful efforts befogged and bedeviled on plate or paper, without a stock of knowledge on hand to clear up the difficulties so that we could intelligently trace effects to cause and consequences. We have at times been wicked enough to think the compounders of bottled solutions as prize packages were imposing upon our credulous amateurs; but when we think that it frequently happens that two in every ten or twenty snap-shots take effect, we don't like to be thought over suspicious. Our mistakes and blunders are often our educators, when we fairly see and appreciate their uses, but they are often humiliating and expensive. What is our loss, however, is the stock dealer's gain, and in this we take a grain of comfort, knowing that but few of them are on the millionaire list. The prime *cause* of my writing this article is the fulfillment of a promise to the publishers, that I would contribute my mite to the International variety; the *effect*, I trust, will not be disappointing.

LANDSCAPE PHOTOGRAPHY.

By W. P. Bacon.

ONE of the most difficult subjects to master in the art of photography is the obtaining of proper proportion of foreground and distance. Many a view is charming, because of the objects in the distance. Perhaps a river winds along like a silver thread, on either side of which is a heavy growth of foliage; or, perchance, rough abrupt rocks jut out, giving the whole a wild chaotic appearance. No point can be reached but where the effect of the distant view can be relieved by some little bush or object, lending color to the scene. It is then that the genius of the operator must come into play. Oftentimes, in views of wild scenes, it is extremely difficult to secure a foothold, to say nothing about setting up camera and having room to focus. The trees often shut out the most tasteful views. By a little work some small trees can be bent to allow a clear view, and yet the foliage may show enough to make some fringe on the picture and relieve the monotony of the scene. It is then unnecessary to arrange for a foreground.

In the more open country the work is easier. Generally half a dozen places may suggest themselves, where just the right view can be obtained. In this connection by all means introduce life into the picture. It is seldom that one is not accompanied in a little hunt for views. Your companion may always be introduced in the scene. Far better, of course, in a landscape where some pasture lands are shown in the center or foreground, would be some cattle quietly grazing. However, these subjects cannot always be found. Your companion may then be introduced as, perhaps, contemplating the scenery, or engaged in some little work which would be proper. Care should be taken that he is not staring at you.

When some special object is sought after, as, for instance, a large rock, moss grown but beautiful, a charm is added by the man standing on the rock; if a lady, perhaps in picking at the mosses or in some other appropriate way. The life often gives a means of measuring distances. A large redwood of the California forests might be made to appear the size of the beech or chestnut tree, but if the figure of a man standing at the base is added, the eye instinctively compares the two and the mind at once notes the discrepancy. In this way we compare known objects with the unknown, and we are given an idea of their relative size.

The presence of life adds a charm in showing that the views are not deserted. What is a picture of a landscape introducing a quaint old house and a walk, and yet all deserted? At summer resorts a view can be obtained looking over a shore on to the lake beyond, and in the foreground an old rustic fence adjoining a walk. To be artistic, several subjects should be introduced looking out over the water contemplating the view or engaged in conversation.

Where a view is taken from a mountain-top, a camp would be a very pretty effect. If this cannot be obtained, two or three sitting together in a natural way would improve the bare view.

There are many other instances which could be cited where the views would be improved by the introduction of life. It is seldom that man cannot be brought into a scene.

THE INDIAN WITCH-SCARER.

BY JOHN W. SANBORN, PRESIDENT NIAGARA CAMERA CLUB.

THE Indians of the State of New York, although located near the centers of civilization and refinement, are, many of them, sincere believers in witchcraft. On one occasion when a celebrated chief was upbraided by a white man for his belief in witches, he retorted upon the white man, "Go to Salem, and behold your ancestors hanging each other for witchcraft."

CHALLENGING THE WITCH.

It may afford the readers of the ANNUAL a few moments of agreeable diversion, if I tell them about the ceremony (which I witnessed) of scaring the witch. It was in early winter, and after a fall of two or three inches of snow. The witches were supposed to have gathered in great numbers, and to have taken possession of houses, barns, woodpiles, food, clothing and everything else, disturbing the quiet of the households, stirring up commotion in the midst of the cattle, preventing the wood from burning when placed on the fire, making the food unpalatable, and the clothing uncomfortable, and making mischief in general.

The witch-scarer adorned himself with a most incongruous apparel. He snatched at anything he could lay his hands on. A woman's skirt was fastened about his waist and gathered about his knees, as shown in the accompanying picture.

He next slipped on a figured waist, put on his wooden mask, with a horse's mane for hair, caught up the rattle made from the shell and neck entire of a large snapping turtle, seized in his left hand the

SCARING OUT THE WITCH.

pestle (or upper) of the great corn-pounder, assumed an attitude of fierce attack, and thus challenged the witch.

He throws the pestle at the pounder, and just beyond it, so that one end shall rest on the snow and the other against the pounder, grasps a second pestle and a sifting basket, and cautiously, yet persistently, approaches the pounder, shaking and pounding his rattle most vigorously. He succeeds, of course, in expelling the witches from the pounder, and his warwhoops and yells frightened them all into the air and away from house and barn.

Having accomplished his task he quickly retires, and a dignified Indian woman, with resolution in her features, appears, re-arranges the pestles and sifting baskets, and proceeds to pound the corn without fear of further molestation from the witches.

These witch-scarers are also medicine men, and their theory of disease is, that any part of the body which is affected is merely clutched by an evil spirit. They put on the wooden masks, and

POUNDING CORN AFTER THE WITCH'S DEPARTURE.

shake the turtle-shell rattles, and whoop and scream, and by so doing frighten the evil spirit away and leave the affected part to recover. If evil spirits can be scared at all, then the New York Indians have certainly hit upon the most successful devices for frightening them out, for their wooden masks, carved by themselves and made to glare at you through eyes of polished tin, are the most fearful looking objects one can imagine.

The views accompanying this article were taken by the writer on the occasion of the ceremony of the scaring of the witch.

PHOTOGRAPHING DOGS.

By W. H. Mapes, Newburgh, N. Y.

WITHOUT claiming to be a specialist in making "dogotypes," as an elderly friend of mine calls them, I consider that an experience of twelve years, with varying success, entitles me to "speak out in meeting," as it were, and, if possible, impart a hint or two to some brother in the profession, whose brain has been racked over the problem of how to successfully catch the one position which each animal's owner considers best for his or her pet. Every owner of a dog has his hobby about position or expression, and many have hobbies which the photographer finds it difficult to satisfy. Nearly all want the picture with the ears erect, and the animal on the alert, just as a great many people insist on having children taken full length standing. And this, notwithstanding the fact that many dogs—pugs and spaniels especially—are so fat and lazy from overfeeding, that they can hardly move, and seem threatened with heart failure every time they climb a flight of stairs. The most frantic efforts on the part of the photographer will hardly rouse such subjects from their state of torpor, or cause more than a few sleepy winks or a stupid stare. When it is my lot to get such a subject to work with, I proceed to handle him without gloves. I growl, bark, yelp, slam doors cry like a cat and scratch parlor matches until the animal is actually tortured into some semblance of interest and activity. Other dogs, the nervous, intelligent fox terriers particularly, will hear and respond to the slightest sound, and so quick is he that I have spoiled many exposures by opening the shutter too quickly and causing the flaps to rustle, and the dog to instantly change position. Fox terriers require the most expert handling, a slight scratching on the camera box or the crumpling of a piece of paper in the hand is usually sufficient to fix their attention and enable their owner to get out of range of the instrument; and often the sight of a rubber ball will throw them into a jaunty, saucy position, which is superb in showing the characteristics of the breed; for a photograph of a dog, whatever the breed, must show that he has blood of good quality in him, must show his style, his carriage and his good points, or else it is but little more than a failure. Setters and pointers are best posed with a kitten or pigeon to fix their attention. Their owners usually ask that they be taken at a point, but in all my experience I have never yet seen one in front of the camera take a perfect point. There is always something a little different from what it should be, that impairs the

NEGATIVES BY D. L. ELMENDORF

CASTOR AND POLLUX

1. WITH 4 X 5 DALLMEYER R.R. AND TELEPHOTO ATTACHMENT 2. WITH 4 X 5 DALLMEYER R.R. LENS ALONE

quality of the picture and causes disappointment. It is quite necessary that the dog be well trained in using live objects to attract him, for otherwise he may create havoc with the backgrounds and accessories, if in the studio, in his attempts to seize the object. I once saw a great Dane dog knock a trainer down in his attempt to seize a kitten which the trainer was holding, and which escaped only by climbing a tree. Newfoundlands and mastiffs are generally easy to handle, and bull terriers likewise, but the best dog of all to photograph is the Scotch collie. I have made pictures of these dogs at every age, from the puppy just opening his eyes, to the patriarch fifteen years old, blind and hardly able to walk, and the mere knowledge of their peculiarities and good qualities has taught me to love the breed.

A collie seems to understand nearly everything that goes on around him; and to see some collies as I have, when photographing them, after posing in their very best style and watching every movement with a knitting up of their foreheads and pricking of their ears, come and sniff at the camera and go away apparently satisfied that it was all right, would convince any one that they possessed a high order of intelligence. I have photographed these dogs singly and in groups, in swimming, at meals, and while asleep, and one of the most enjoyable experiences I ever had was in taking a pack of them while exercising in deep snow, leaping and running and tumbling over each other in wild sport, barking and yelping all the while. The success I have had with these dogs, and in fact all others, has come from my love for them. I have never made a specialty of this class of work, because I have been ambitious to excel in portraiture, but I can readily see in these days of specialists and specialties, that in a locality where kennels or lovers of thoroughbred dogs are numerous, if a photographer could successfully secure the positions desired, he could not fail to profit by making a specialty of "Dogotypes."

A FEW WANTS.

By H. T. Duffield, New York Camera Club.

THE amateur photographer is a creature of many wants. Nearly every day some of these wants are supplied, but this does not appear to decrease his stock—in fact, it does seem as if the more you give him, the more he desires. I am referring to the average amateur—he of a fair amount of knowledge of the art photographic, and who has only one or two days of the week to put such knowledge into practice. Day after day, month after month, he goes on taking pictures with more or less success, every one of which has a want connected with it, such as "Wanted more exposure," or "Less exposure, or "More" or "Less development," and so on. Seeing other "averages" work, and doing my own work, has caused me to have ideas of certain wants which, if supplied, would do much to making our photographic existence far happier than it is now. I leave the "how to do these things" to the fertile minds of those persons known as "photographic sharps."

The first want is a way of developing, fixing and drying the plate while it is undergoing exposure. How nice it would be, after pulling the slide of the plateholder, and while the rays of light are acting on the sensitive silver, to have the above operations going on at the same time, so that when the exposure is done, everything else necessary for the making of the negative is finished; no dark-room with its feeble light would be needed; no long washing after fixing; no tedious waiting for the plate to dry. Of course there would be no help for it if the plate was under or over exposed, but there is not much now, and such plates even if "tentativated" (which is a new and claimed-to-be-original term), are not much good anyway. Don't ask me for particulars how this exposing, developing, fixing, drying business might be done, for I do not know.

The second want is some substitute for glass for plates, that will be as transparent and rigid as glass, freer from bubbles and other imperfections, absolutely unbreakable, and much lighter. Now, please do not say "films."

The third want is some silver salt for sensitizing albumen paper, which will be sensitive enough to print by artificial light. The amateur has to do most of his printing during days when he cannot go out after pictures; often his negatives taken during spring and summer have to be left for printing until autumn and winter. If he could obtain a silver salt sufficiently sensitive to gas or lamp light, he could make prints of his negatives shortly after they were taken. I believe this want, if supplied, would do a great deal toward improving the average amateur in the art. It would be lovely if we had platinum and carbon papers of equal sensitiveness.

The fourth want is platinotype paper, of which only the middle part of the sheet is sensitized. In past days, when the printer made his own paper, he could put the solution only on the middle of the sheet, leaving a nice white margin all around the picture, so that it resembled an engraving. Now, if one wants to have such a margin, he has to paste the picture on the sheet of paper, which never looks well. If we could get, say 8x10 sheets with a 5x7 space in the middle of them sensitized, we could have them bound to resemble a book of engravings. It is true we can buy 8x10 sensitized sheets of platinum paper, but we are not all millionaires.

The fifth want is some other fixing agent than hypo. The supplying of this want is much desired, for having to wait twenty-four hours for a plate to wash and dry after developing, is a nuisance and entirely un-*fin de siècle*.

The sixth want is a hand camera, which is so constructed that the plate will be always parallel with the view, avoiding negatives which have the scenes crooked on them. Often exposures with a hand camera have to be made quickly, and the operator has not the time to get his instrument straight with the view. Both the box and the camera in it might be made round, the camera detached from the box and hung on pivots, so balanced that it would be right end up.

As I have said before, I leave the supplying of these wants to the ingenuity of those gentlemen termed by the irreverent, "photographic sharps."

POSTAL PHOTOGRAPHIC SOCIETIES.

By Richard M. Worden, Preston, England.

IN your first volume (1888, page 307) there is an article on the above by Mr. Martin J. Harding, of "Sun & Co."; it was a very good and timely one, and there is no doubt that it carried out the object of the writer by inducing other enthusiasts to form similar companies. In looking through the "Amateur Photographers Blue Book" for 1893, I find there are about twenty of these postal clubs in England; no doubt there are some in existence not mentioned therein—in fact, I know that there are. From the vast number of amateurs (and amateur photography is ever spreading) there must be plenty anxious to join together in forming these useful societies; hence it has occurred to me that a few notes by way of supplement to that of Mr. Harding, may usefully serve the purpose as a contribution, for which you have asked me.

There can be no question as to the advantages to be gained by both beginners and others more advanced. Probably it does not become apparent to everybody what benefits are afforded by these postal clubs, so I will now jot down, in short, some of them as they occur to me.

1. The beginner. To such an one the advantages are really invaluable—he has his faults openly and clearly pointed out to him—he sees them the more readily by a comparison of his own work

with that of the other members. He can ask questions and will undoubtedly get one or more thoroughly practical answers—the criticisms he makes on the work of his fellow-members are criticised, whereby he sees if his judgment has been right, if not, where he has erred. Generally, he sees much to urge him on; he is afforded one of the best ways to get on, and with his will thrown in, he comes on with a pleasure to himself, and to those who are ever ready to help him; and last, but not least, at a very small cost, as will be seen later.

2. The advanced. They will find it an excellent medium for keeping in practice at a small outlay, besides affording a means of keeping up with the daily advances and new products brought into the market.

Further, who is there that does not find himself at times in a fix, whereas, he only need state his case in the question book, and he will generally find some one ready with a solution of his difficulty.

Another feature, and by no means an unimportant one, is that a mutual exchange of prints between members is often carried out.

It also enables one to go through an exhibition with some real satisfaction, by being the better able to judge of the exhibits and to follow more closely the awards of the judges thereon.

To many it will be a consideration to carry out the working of a postal club at a minimum cost, and as a guide I will state, in brief, the rules and method of working the club of which I am secretary.

1. No of members, twelve.

2. The folio is made of thirteen stout envelopes, one for each member and one for exchange prints. Envelopes made of manilla are about the best.

A note-book for remarks and suggestions, to be of same size as criticism slips.

An exchange book, the same size as the note-book.

Printed slips for criticisms, about the size of commercial note paper, leaving a fly-leaf in which to slip the print.

3. The folio goes the round of the members bi-monthly, and each member inserts his contribution on receiving it. Five days are allowed to each member, the day of receipt and posting counting as one day each.

A small fine is imposed for retaining the folio over five days, also for not contributing requisite number of prints.

An entrance fee of 1s. 9d. is charged to all new members; this being the amount levied per head on the formation of the club in 1887.

The actual cost, per member, per year, for postage and printing criticism forms, does not exceed 3s., say 75 cents.

The above I should have mentioned has reference to prints not exceeding ½ plate. Of course a great deal more could be said for these postal clubs, and more elaborate rules framed, but I think it will be found that what I have stated above is as simple and economical as can be desired by anybody.

This year we are having a competition among ourselves, giving two prizes, one to each of the members who, by the vote of all the members, sends in the best work through the year.

A NEW——

By Charles E. Fairman, Washington, D. C.

If I should write out in full the subject line "A New Developer," it is doubtful whether many of the readers of the Annual would read more than the title, for we have so much said and so much written about new developers, that such a title is apt to produce a shock instead of resulting in entertaining or instructing the reader. And, on the other hand, we have so many sermons preached from the text, "Stick to one developer," that I am aware that I am treading on dangerous ground, when I introduce a new developer to the dark-rooms of the readers of the Annual. I have for a long time used pyro (good old pyro) in my work, and while I have the greatest regard for this developer, still it is too much to suppose that one developer will do all kinds of work, so as to produce the best possible results. We do not expect this in other matters—we do not expect that the same medicine that is given for whooping cough is the best remedy for a fracture, and so we want to get our photographic minds out of the way of thinking that there is only one lens, one plate, and one developer, and that we must stick to that one.

It has been my experience that, for a properly exposed plate, pyro gives the best of results, and probably as good as, if not better than, any developer in the market; but for a very rapid exposure pyro seems to be lacking in the ability to secure everything that has been transferred to the sensitive plate, as the result of the following experiment will show. I was anxious to make a series of figure studies in such poses that it would be impossible for the model to use a rest or hold the position without danger of moving, if a time exposure was made, and therefore resolved to use a rapid shutter and trust to careful development. I used for this work a Gundlach R. R. lens, 9¼ inch focus, worked at an aperture of $\frac{f}{14\frac{4}{5}}$; the plates used were

Stanley, Sens. 35; the speed of the shutter I am not able to give, and can only say that all of the exposures were made with the same speed of shutter. Having arranged the studio, I made eight exposures, one after the other, so that there was but little if any variation in the light, as the sun was shining during the whole time and the exposures were made, as near as could be judged without the use of a meter, in a uniform light. Of the eight exposures made in this manner, I developed two with pyro made up from Seed's formula. The negatives were first soaked in a solution of sal soda, made by dissolving one ounce of sal soda in eight ounces of water; the results were far from satisfactory, as my persistent coaxing was unable to secure a negative that would yield a good print. I then concluded that if pyro was used it must be used in a different manner, and then mixed up my next batch of developer as follows: Stock solution of pyro, 3½ drams.; stock solution of sal soda, 1 dram.; to this I added 1 dram of a 10 per cent. solution of bromide of potassium, and 12 ounces of water, put the negative in the tray, poured the developer over it, and after rocking it carefully for a few minutes so that any precipitate might work to the bottom of the tray, I covered the tray and left it to soak for eight hours. I found that by this slow development with weak developer, I secured a beautiful negative with detail that I have seldom seen surpassed in any negative, but concluded that as I had five more negatives to develop, I could hardly afford to use forty hours in their development, and therefore tried a developer which is rapid enough for all ordinary snap-shot work. I give below the formula:

A.

Metol	50 grains
Sulphite of Soda	1 ounce
Water	10 ounces

B.

Hydroquinone	100 grains
Sulphite of Soda	400 "
Carb. of Potash	240 "
Water	20 ounces

The remaining five plates I developed by taking 5 parts of "A," and 7 parts of "B," to which I added an equal amount of water, and was agreeably surprised by finding that the negatives developed as though they were time exposures, the detail in the shadows being perfect without any appearance of fog, and with sufficient density to give good printing effects. But I am aware that there are many amateurs who prefer a one solution developer, and for their benefit the following formula may be useful:

Metol	50 grains
Hydroquinone	100 ,,
Sulphite of Soda	2 ounces
Carbonate of Potash	½ ounce
Water	32 ounces

To develop, take one part of the above solution and one part of water.

I firmly believe that by using either of the above formulas many choice negatives can be saved, which, if developed with ordinary developers, would be thrown away as badly under-timed. Perhaps, after all, what I have written would be better called a new use of old developing agents, rather than, "A New Developer."

DEVELOPING.

By F. M. Rood, Poultney, Vt.

I WONDER if it is possible to write an article on developers without giving a set formula? One of the latest developers, metol, seems to be pretty fine; it does not stain, gives splendid detail, fine gradation, good strength and color, works at any temperature, keeps well—same solution develops several plates, and altogether, it seems to be entitled to a generous share of "the cake," if not the whole.

The first time I ever saw metol used was by a friend of mine, who was visiting me from the city—a professional who is *high up* in the business. He had What's-his-name's plates with him to use. I was charmed with the action of metol on his plates. I had him try it on T'other-chap's plates, which I had in stock and was using with good success with eikonogen and hydroquinone mixed. With his metol he could not get a good negative on my plates. It would start nicely, but fog over before sufficient strength could be got, and sometimes before the detail was all out. My friend said: "T'other-chap's plates are no good, get some What's-his-name's and you will be all right."

As soon as he left I got a lot of W—— plates, though I had quite a stock of T—— plates on hand. I studied all the metol formulas I could find in the journals and elsewhere, and made up my developer, following no given formula exactly, to suit myself and the needs of a small gallery. I have three stock-bottles. A contains water, metol and sulphite; B is water and carb. potash; C is water and bromide potash, 48 grains to the ounce.

For use I have three four-ounce wide-mouthed bottles, that I can easily distinguish from each other—one square, one round and one yellow. In one I put metol stock solution and a little potash solution; in the second is potash stock solution and a little metol solution;

the third is the same as the second, with the addition of 3 drams of the bromide solution to the 4 ounces. I used my T'other-chap plates to try my new developer, and found they would work *fine*, the same plates that my friend from the city could get nothing on with his developer. What could be the reason? I compared his developer with the one I had evolved from various formulæ.

He used some hydroquinone with his metol, but it could not be that, as I have been using hydro combined with eikonogen on the same plates. He used bromide of ammonium, but it could not be that, as they would fog under his developer when the time was correct, and no bromide used. He used carbonate of soda—that must be it—probably that particular brand of plates takes kindly to carb. potass., but is not suited to carb. soda. My T'other-chap plates were condemned unjustly; a slight modification of the developer worked them all right, and the same developer (with carb. potass.) works equally well on What's-his-name's plates. I happened to hit on the developer that was best for the condemned plates the first time; had I not, I might have returned them to the dealer with the information that they were worthless. After such an experience, how can I write a formula for the plates you are using? Get some metol and study it up. To any one who has not tried metol and wishes to do so, I would advise making stock solutions as indicated (or carb. soda if you wish to try that), which, when combined, will make a normal developer, each ounce of which will contain:

Metol	3 to 3½	grains
Sulphite of Soda	30 to 35	"
Carb. Potass (or 20 Carb. Soda)	10 to 12	"
Bromide	½ to 1	"

From the stock-bottles you can make any combination you need; add water if it works too strong. Experiment and find what will give best results with the plates you are using. Vary the proportions of the chemicals used and you get a practical knowledge of what results can be produced with metol that you would not have if told just what to do and use. You will probably find that with proper time an increase of alkali, after the plate is partly developed, will, in a measure, increase the contrast by building up the high lights the fastest; an increase of metol gives greater density all over, strengthening the detail in the shadows equally with the high lights, and seeming to sink the image into the film. Dilution with water produces slower development and softer negatives. Bromide answers the same purpose as in other developers; by having the three kinds of developer above mentioned ready to apply from separate graduates, or in different trays, one can shift from one to the other quickly as needed. For an over-timed plate metol alone might suffice for the complete development, without any other alkali than the sulphite that you have in stock-bottle A furnishes, or you can soak in bromide and water alone. For short-time exposures use developer No. 2; no bromide unless you see you will need it.

Here is an experience in fixing negatives that has impressed me lately; sometimes when a negative comes out of the fixing bath (especially if the bath has been in use some time), it shows through the glass on the back a bluish-white fog or film, as though not fully fixed; leaving it longer in the fixing bath does not remove it; it does not show much on looking through it, and does not affect the transparency of the shadows much, but it does not look right and ought not to be there. I find that a good strong solution of plain hypo in water, that has not been used before, will remove it. I have the hypo in a stock-bottle handy, and put an ounce or so in a small cup and pour it on and off three or four times, throwing it away after use, as it is cheap; it *cleans up* a negative ready for washing. I hope the foregoing may be of use to some one.

"THE PHOTOGRAPHIC FIEND."

By Jos. P. Beach, Cheshire, Conn.

AN expression often seen in the public prints, it has almost become a synonym for the amateur photographers, whose presence at seashore and other summer resorts is looked upon with fear and trembling by all who dislike to "see themselves as others see them," or who, for many reasons, wish to enjoy their summer outing without the liability of being made the victims of those vicious wielders of the camera, who seem to delight in photographing every person or pair whom they can focus in some ridiculous position.

It has always seemed, to the writer of this, an outrageous shame that these photo fiends are allowed to be abroad in decent company. Yet we frequently see them of both sexes, prowling about the shore, or in the woods, intent upon photographing some summer girl, who, with her admirer, may be innocently indulging in a flirtation, doubtless perfectly proper, in the solitude of a woodland bower, or beneath the sheltering shade of a large umbrella upon the sands of the seashore. The picture has, however, quite another appearance, and is not at all funny, when the summer girl and her beau see themselves "as they were," in a photographic presentment of the scene; especially when numerous blue prints of the same are gleefully and indiscriminately distributed by the male or female "fiend" among the frequenters of that summer resort.

When such pictures are made, and circulated, with the consent of those photographed, it is not, of course, fiendish, but when the thing is done without the knowledge or consent of the parties interested, it is not only fiendish but devilish, and merits the condemnation of every right-thinking amateur photographer—and should be prohibited by legal enactment.

The writer has seen not only young and reckless "fiends" indulging in this kind of sport, but great big male and female fiends, old enough to know better, aiming their cameras at every person on the shore sitting or lounging about in some unconventional attitude.

I was once shown a collection of forty or more photographs taken at a seashore resort, without consent of the people who were shown in many ridiculous positions, and who would have been very much mortified if they had known that their counterfeit presentments were being handed about, and being made fun of by the fiend exhibiting them.

I asked the man, an incipient D. D. S., if any one had kicked him, or blacked his eye, while getting together this unique collection.

"No," said the fiend. "Why do you ask such questions?"

"Because," I replied, "if I had seen you taking such a picture as that (taking up a very objectionable one) of my sister, or sweetheart, I would have either kicked you, or blackened your eye, or smashed your camera."

"Nonsense!' replied the fiend. "I only took it for '*fun.*' I don't know the girl, and she don't know me. She is stopping at *Blank's* hotel, and I am living in a friend's cottage at the other end of the beach."

"Yes! but you are exhibiting these pictures to me, and you have been showing them to others, and probably intend to have them on exhibition when you return to the city."

"Of course," he replied. "I expect to show them to my friends at home, when I go back. Why not?"

It is to be hoped that this "fiend" will happen to show his collection to the big athletic brother of that young girl, and if that brother is of an irascible temper, there will be music, or something else, in the air in the neighborhood of this fiendish young dental surgeon; for with the obtuseness of most all of those who delight in taking this class of outing views, he refused to listen to my remonstrances, and declined to destroy so compromising a negative.

On one occasion the writer observed a young man with a kodak tramping along the beach, at a fashionable seaside resort. His kodak was hidden in the folds of a large red-and-white handkerchief. Whenever this "fiend" came across a couple of lovers, billing and cooing "under one umbrella," he would flop down on the sand in front of them, or in their immediate vicinity, and proceed to take a snap shot.

The writer of this expended three good hours of that afternoon in following that young man, and, by the aid of a green-lined white umbrella, defeating every attempt to photograph either lovers or other people attitudinizing upon the sands.

The fellow at last wrapped up his kodak and left the beach, his backward glances at the white umbrella seeming to indicate that it sheltered a detective, or at least a preventative, against which it was useless for the fiend to contend.

Now, Mr. Editor, is it not time for all right-minded amateur photographers in the country to reprobate the taking of such pictures, or photographing any scene which, if exhibited in a mixed company is calculated to give pain to, or mortify, any person unwillingly chosen as an object for the sport or derision of the camera owner.

SOMETHING ABOUT PLAIN PAPER PRINTING.

By C. H. Clarke, Kansas City, Mo.

IN an article in last year's Annual I had something to say about printing methods, and gave an idea or two on the then comparatively new direct printing porcelain positive plates, or, as they are perhaps better known, "luxotype opals," in connection with direct printing transparencies. I supposed at the time this article was written that the process was probably much better known by the majority of amateurs, especially in the East, than myself, and that there would be little if anything in the aforesaid article which would be new or even of passing interest. Imagine my surprise, therefore, to receive a large number of communications from amateur photographers asking for more details of the process. Several of these communications were received even before I had received a copy of the Annual, and had seen the article in question in type. One of the singular things was that some of my correspondents lived in New York city and were located in the very same block with the manufacturers of these porcelain plates, and yet had never heard of them, and wrote to me for information as to what they were and how and where they could be obtained. Of course it afforded me a great deal of pleasure to furnish the desired information; but I could not help being impressed with the idea quite forcibly, that in the line of experiments and the adoption of new ideas, the amateurs of the "wild and woolly West" have scored a point on their brethren of the "effete" East.

During the past year other matters have held so much of my time and attention that I have not had the opportunity to do much in the photographic line, much as I should have liked to have done so, and therefore I feel myself scarcely equal to saying anything that would interest the great army of workers in the "beautiful art," or even writing an article that would be worth the reading, so far as the information contained therein is concerned, and I am sure I am not gifted with either a flow of language or the talent to put my thoughts in writing to the extent of making a readable article out of nothing. Therefore I feel much like replying to the Editor's kind invitation to contribute to the 1894 volume, with a polite letter expressing my inability to comply with the request. But on second thought, judging from last year's experience, it is barely possible that I may be able to suggest an idea or two which some poor struggling worker has not thought of, and with this idea I am constrained to once more make the effort to assist in filling the pages of one of the most interesting publications extant.

The subject of printing methods is one which has probably been discussed and rediscussed over and over again, quite as much if not more than any other branch of the photographic art; but notwithstanding this, it is my opinion that it is in this branch that the most startling discoveries are yet to be made. Within the past few years many new methods have been brought out, experimented with, pronounced successes, and then, in a few short months, have been abandoned for something new. Other methods have been modestly put before the fraternity, have been adopted, and have apparently come to stay; but in the light of the never ceasing onward and upward trend in photographic research, who can say of the many beautiful printing methods now extant, there is a certainty that a single one of them will be in use a quarter of a century hence? I for one scarcely believe that there will be, although I do think that one of the oldest of the present methods is sufficiently beautiful and satisfactory to endure to the end of time. True it is that this method has been sadly neglected, and, indeed, almost lost sight of, in the scramble for something new; but it is also just as true that the beauties and possibilities of this method are even greater than many, if not all, of the so called new ideas.

The method I refer to is no more or less than the modest little plain paper silver print, which enjoys the distinction of forming the foundation of almost every other printing process now in vogue. To my mind there is no process known which is so easy to manipulate, or which gives such uniformly beautiful results, as the plain silver prints. It is as far ahead of albumen, aristotype and kindred methods as the sun outranks the moon in brilliancy, and its range of treatment is surely much greater than either, or even than all, of the others combined The only thing that in any degree approaches it is the platinotype, and, technically speaking, it is the same thing, except that platinum instead of silver is used for sensitizing purposes. The silver print, having the advantage of being much easier to manipulate, and, in my opinion, possessing equal, if not greater beauty, is therefore the preferable, to say nothing of being much less expensive.

The objection will be raised, no doubt, by the advocates of albumen, aristotype, etc., that the plain silver print is not susceptible to the high burnish which can be and is applied to the other methods. This is undoubtedly true, and therein lies its particular beauty, for who is there among the competent judges of art who will not agree with me that this selfsame burnish is what destroys the artistic merit of a really beautifully handled picture? A mirror-like surface may be, and no doubt is, pleasing to many eyes, but not to the true lover of art, who judges work from an artistic and not a mechanical standpoint. The professional photographer says the public demands highly burnished pictures, and the amateur follows in the footsteps of the professional, because he thinks that what the public demands is the correct thing. There are, of course, exceptions to this rule, but I believe I am safe in saying that this will apply in a majorty of cases. I take issue with the professional in this idea of public demands, and I believe I can prove my point that the public demands no such thing, and is only too anxious to get away from the burnishing roller. For example, one of the leading professional photographers of Kansas City became interested about a year ago in some experiments with plain silver printing, and after several modifications of formulas for a silver bath, toning bath, salting bath, etc., produced a dozen or more prints from choice negatives, which he first exhibited to his friends, and then displayed in his showcase. The public, ever alert for something new, noticed them, and they soon became the center of attraction and the subject of much comment and speculation. It became noised about that Mr. Thomson had a new process, and a very beautiful one, and customers began to flock in to have some of the new process pictures made. Now,

FLASH LIGHTS.

By John H. Shaw, New Haven, Conn.

NEARLY every one I meet has a different way for taking pictures by flash light.

I will describe the method I employ. After getting the group placed, trying to have all appear as natural as possible, keeping them away from a wall or other background as far as possible, to avoid deep shadows, I get my focus by having a candle or small lamp held in the center of the group, and focus the flame as fine and sharp as I can, then hold the light at either side of the group or object, to get the location correctly on the plate.

Do not turn down any lights in the room, but have as many burning as possible, but do not let them shine directly into the lens.

For the flash, I use a McCollin lamp and "Blitz Pulver."

A cartridge can be used, but the subject is apt to watch for the flash, and many times has the eyes turned.

I keep the lights lighted in the room to give a more natural look to the eyes, as a person is very likely to have the eyes very wide open if the room is darkened.

I set my lamp on top of an iron rod held in a music rack stand. By this method, I can adjust my lamp to any height I may require. Always have the lamp a little to one side and back of the lens, also a foot or so higher.

After making a little pile of the powder on the pan, having placed the lamp in position, light it. Never get the face near the powder when about to light it, or after the light is lighted, as although I have not been able to light the powder with a match, it might go off and do much damage.

Now draw the slide from the plate holder and uncap the lens. Do not be in a hurry, as a minute or two would not hurt the plate, if only the lamp or gaslight were in the room.

Ask if all is ready, and then squeeze the bulb, gently but firmly, and after the flash, recap the lens and replace the slide.

By this method I have taken many very lifelike pictures by flash light.

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CHILD STUDY

BY E. B. CORE

MOUNTING PRINTS.

By W. L. J. Orton, Coventry, England.

I AM afraid many amateurs are a vast deal too timid when mounting gelatino-chloride and bromide prints, and hence many indifferent specimens of such mounting I often see.

When these, or in fact any prints, have to be mounted on detached or separate mounts, the following method will be found highly satisfactory. Trim, when dry, all the prints you wish to mount to the size required. Provide the following articles: A cup full of freshly made clear starch, a basin of clean water, a soft sponge, a soft towel and old newspapers. The starch must be clear and free from lumps, and as soon as made, and while hot, a large lump of loaf-sugar should be dissolved in a teacupful of it. The starch should not be too thin, but anyone will know how to make this.

The *modus operandi* is as follows: Take a print, and with the fingers rub the starch (which must be cooled down to say blood heat) well into the back and also on the front of the print till it becomes quite greasy to the touch. Then the print must be placed on the mount and properly adjusted into position, which can easily be done owing to its slippery nature. To be able to do this is a great convenience when using mounts which have a tint printed on them, as nothing looks so unsightly as an unevenly mounted print on these mounts, and if mounted dry, it is very difficult to place the print correctly into position. When the print is right on the mount it should be held in that position with one hand, while the finger of the other hand should be passed from the center to the edge, pressing firmly all the time. This will cause all the superfluous starch to exude from the edges of the print, which will lie closely and evenly on the mount. The starch on the face of the print acts as a lubricant, and there is no fear of tearing the print or abrading the surface. When two or three prints have been mounted in this way, their surfaces should be sponged over with a damp sponge, which will remove all the starch from the surface of the print and from the exposed mount, and they will dry with a fine finish. The sponge should be constantly rinsed in the basin of water to keep it clean, and the water itself should not be allowed to get dirty, otherwise, if any water after sponging is left on the print, it may show as a dull mark when dry. If, after drying the prints, any starch-marks should be seen, they can be removed by responging, using a fairly wet sponge. It is obvious that with this method, only one or two prints can be mounted at a time in an album with fixed leaves, as the surface of the print must not be in contact with anything when drying, but for every other purpose I can confidently recommend the above method.

MOUNTING GELATINO-CHLORIDE PRINTS.

By H. Crisp, Ballarat, Victoria, Australia.

ONE of the most common complaints made by users of the now popular gelatino-chloride printing out paper, is (on this side of the world at any rate) the difficulty attending the usually simple operation of mounting; as unless most carefully manipulated, the beauty of the finished work is certain to be marred by finger marks, or small portions of the mounting medium, which, somehow, will find their way to the front of the print; or again, in the case of enameled work, if by the exercise of extra care and cleanliness, a favorite subject is mounted and finished without flaw, the first friend to whom it is shown is certain to touch the beautifully glazed but delicate surface with a moist finger, and then, alas! an ugly mark results, which it is impossible to remove or ameliorate. By following the directions as given below, this most annoying trouble may be entirely cured, and the operation of mounting made a pleasurable one in place of the dread which it has hitherto been in my own, and, I am sure, in many other amateur's experience.

The prints are toned and fixed in the ordinary way, and then well washed; not in a perfunctory manner, but thoroughly, as the permanence of the work entirely depends on the perfect removal of the fixing solution.

They are then placed one by one on a sheet of glass, and well swabbed, back and front, with a tuft of cotton wool, the object being to remove all grit and dirt, which seems to have a particular affinity for the gelatine surface.

After a final rinse under the tap, and draining, they are placed in the following bath:

A.	Alum, 2 oz. Water, 15 "	B.	Tannic Acid. 1 dram. Water, 5 oz.

Dissolve A and B separately, and mix. The bath may be used over and over again till its hardening power is found to diminish, an occasional filtering being all that is necessary to keep it in good order.

Five or ten minutes' immersion will be found sufficient to thoroughly tan the gelatine surface, after which give a short wash (as only the surface solution can now be removed), and dry in blotting paper in a similar manner to the method usually accorded to prints on albumenized paper.

In mounting, the ordinary starch paste may be used, but I prefer the following:

Gelatine one ounce, soaked an hour in water; pour off the water, and dissolve the gelatine by heat; then add, in a small stream and with constant stirring, sufficient methylated alcohol to reduce to the desired consistency.

If any of the mountant or fluff from the blotting paper used in rubbing the print down adheres to the gelatine surface, it may be removed by sponging same, either soon after mounting or when dry. Once dry it will be found that moisture will not penetrate the surface of the prints for a considerable time, and they may be wiped over repeatedly without risk.

In the case of prints which require to be enameled, in place of drying off in blotting paper, squeegee to glass, and back up with thin card as usual, and when dry they will be found capable of standing a lot more knocking about, without damage, than prints not treated by the before-described process.

To put the matter briefly: the prints are, in addition to the usual operations, passed through a hardening bath which renders them practically waterproof.

AN OLD FRIEND.

BY H. W. HALES, RIDGEWOOD, NEW JERSEY.

UNDER this heading I propose to write a few words in favor of our good old friend, albumen paper. In these days of thin, flat and lack-luster negatives and the consequent rage for the so-called aristotype paper, is it not time that we look carefully back, and compare the best results obtained with our old friend albumen, side by side with the best results from the chloride papers?

In these remarks I do not wish to disparage the use among amateurs of the aristotype papers, as they are certainly very convenient to those who have little time to spare for printing, and the combined toning and fixing is also a saver of time. To the photographer, however, who wishes to get the best possible results, and is not afraid of the work and trouble to attain that end, there is very little doubt that good albumenized silver paper will not only give the best prints, but the toning will average much better from the majority of negatives. As to permanence there is certainly no comparison, as most of the aristotype prints are lamentably fugitive as far as keeping qualities are concerned. As I write, I have before me a number of aristotype prints by some of the best photographers in the country, and although their testimonials to the aristotype companies are very flattering and gushing, the faded and seared look of the prints that are only a year or two old is anything but favorable in bearing out their testimonials. Now, on looking over an equal number of silver prints of same age, what do we find? Simply that they have either not faded at all, or that the fading is so slight as not to be noticeable.

Here, then, we have a few thoughts that are well worth remembering. We have heard so much every few years about the printing process of the future that one would have thought that silvered albumen paper was doomed long ago.

Our good old friend, however, still exists, and will continue to do so, and after the rage of flat, hazy, button-pressed negatives has had its day, and our more artistic workers come to the front as they should do, then will our old friend be appreciated as he deserves, and there will be less complaint of prints fading, or not having good tones and color after keeping a few years.

ON THE GETTING OF DENSITY IN NEGATIVES.

By Chapman Jones, London, England.

THOSE photographers who are accustomed to do work of various kinds, will know that it is not always possible to get sufficient density in negatives by simple development. The need for afterward increasing the density has led to the description of many methods of intensification. It appears that almost every method proposed has been recommended, not because the inventor or discoverer knew anything about it in a scientific sense, but merely because he had found it apparently successful, and this applies too often to methods suggested by men who might have examined into them, and tested their reliability if they had so wished. The result of this is that we have in common use some methods that are not reliable, and others that may or may not be.

I have examined most of the mercurial methods of intensification that are not quite obviously at a glance worthless, and have failed to find more than one reagent that can be relied upon to follow the application of mercuric chloride, and that one is ferrous oxalate. By the use of ferrous oxalate one gets an atom of mercury added to every atom of silver, and the changes involved are perfectly reliable, inasmuch as it is impossible to go too far with either reagent, and the result may be depended upon as permanent. Moreover, one has a pure metallic image, which is just as readily intensified as the original image. Some have failed in attempting to use this method of intensification, but, so far as I can ascertain, the failure in every case has been caused by incomplete washing, or by stains previously on the plate. The remedy, therefore, is obvious.

Many workers have recommended alkaline developers, or one of the organic developers mixed with sulphite and with no alkali, to be used instead of ferrous oxalate, but these recommendations appear to have been based upon nothing but a suspicious empiricism. I have endeavored to find such a mixture that should merit confidence, and have failed. All the mixtures that I have tried dissolve out mercury that ought to be in the image, and do not dissolve it out in any fixed proportion. The result is therefore uncertain, both as to the general increase of density, and as to the uniformity of action in different parts of the plate.

The one aim of science in its application to an art like photography is to secure certainty. Certainty, that is, that the operation carried out will give always the same effect, in quantity as well as in quality, and that the effect produced may be relied upon to last as long as may be desired. On this ground I would urge the adoption of the method of intensification that I have advised, and I believe that those who once fairly try it will never afterward apply any other method to half-tone gelatine plates that they value.

THE MANIPULATION OF VERY SENSITIVE PLATES.

By John A. Tennant, New York.

THE widely increasing use of very rapid plates for every-day photographic work suggests, more as a reminder of points in practice known but often neglected than as something new, a word of caution as to the conditions conducive to success in the manipulation of such plates.

In negative making with plates marked or known to be over Sens No. 25, the best results are only possible by a combination of extreme care on the part of the photographer, exactitude in formula and manipulation, pure chemicals, and watchfulness regarding temperature.

In the first place such plates should be stored in a cool, well ventilated closet or room. More than ordinary care is required, also, in handling the plates before exposure; they should be jealously shielded from too long an exposure to the dark-room light while being placed the aid of the publications of other known authors, that a retarding action of borax by its application in the developer does not take place, and that its action is rather similar to the alkalis used. Col. Waterhouse recommends the following two formulas on account of their great durability. Borax takes here the place of potash or soda.

A.—HYDROCHINON DEVELOPER

Hydrochinon	10 grams
Sulphite of Soda	10 "
Borax	30 "
Water	1000 c.c.

B.—EIKONOGEN DEVELOPER

Eikonogen	10 grams
Sulphite of Soda	20 "
Borax	20-30 "
Water	1000 c.c.

As can be seen from these formulæ, the borax is here in a solution of from 2 to 3 per cent. of the total developer. If Henderson's assertions were correct, an exposed plate could not possibly be developed with a developer made according to the above formulæ. Practically, this can easily be determined.

Outside of Germany other similar additions, although not applied exclusively in the developer, have been made—as, for instance, the following developer—with phosphate of soda:

I.

Hydrochinon	6 grams
Phosphate of Soda	10 "
Sulphite of Soda	30 "
Water	240 c.c.

II.

Phosphate of Soda	10 grams
Carbonate of Soda	30 "
Water	240 c.c.

For use, take one part of I. and one-half of one part II., and add one part of water. The phosphoric acid bound with the alkali has therefore here just as little a retarding action as the boric acid in borax; on the contrary, the alkaline action is here of more effect. It is therefore my opinion, that as long as a developer has an alkaline reaction, and contains no iodide, bromide, or chloride salts, it will not be weakened in its action by borax, but, on the contrary, will be strengthened. Many compounds of acids and alkalies will behave like borax, in case the same has an alkali reaction, while the addition of a free acid has, of course, a retarding, if not almost entirely paralyzing, influence upon the action of the developer. The weaker the acid in its free condition the smaller is its action, while in connection with an alkali this property seems to be of no account. I would only call to mind that lately sulphate of soda (Glauber's salts) has been used as a preservative in the developer in place of the sulphite of soda, and without any disadvantage. But it should be remarked here expressly, that some compounds (according to Dr. Eder) act here as sensitizers, therefore as accelerators. To these belong sulphite of soda, nitrate of soda, caustic potash, arsenate of soda (in the ferrous oxalate developer), and hyposulphite of soda.

As borax has come into considerable use in photography lately, it would be worth while to give a little more attention to a study of the photo-chemical properties of this substance.

EIKONOGEN DEVELOPER FOR PROFESSIONALS.

By W. A. Nye, New York.

WHILE it is true that the majority of professional photographers use pyro for their studio work, some have tried eikonogen and are using it with much success. I have found the following formula to give an economical, clean-working developer:

No. I.

Eikonogen	1 ounce
Sodium Sulphite	2½ ounces
Warm water	50 "

No. II.

Potassium Carbonate	1 ounce
Water	12 ounces

For use, take 3 ounces of No. I, and 1 ounce of No. II, adding ½ to 1 ounce of old developer. Many operators start development in old developer and finish in new. This I believe to be a mistake, as the old developer acts on the high lights without giving any detail in the shadows. Indeed, I think that this practice is partly responsible for the many black and white pictures we see.

I advise starting development in fresh developer instead of old. Should the plate develop too rapidly, it should be removed at once to a tray containing old developer. This developer and this treatment will always give a negative full of detail, roundness and softness, and yet with abundance of vigor and snap.

SPOTS.

By W. N. Jennings, Philadelphia, Pa.

THEY met:

Two photographic friends.

"What's new?" asked Jones.

And Smith exploded:

"It's an outrage. Not a plate in the market worth a button. Spots, streaks, pin-holes, fog, frill and mush. As for films!!!!"

The rest had better be left unsaid.

Smith had decided to quit photography and buy a bicycle; cease developing plates, and develop a pair of round shoulders.

"Strange!" remarked Jones, at the end of the excited recital, "I never had better results than I'm getting this year. What plates are you using?"

"Oh, everything from 'A' to 'Z'—all the way from 'Quaker City Clingstones' to 'St. Louis Lubricated Lightning.' All the same. Not a good plate in the lot."

"And your developer?" quietly queried Jones.

"Tried 'em all, from plain 'Oxalate' to the latest Berlin decoction: 'Pyro-phrenol-para-cum-damit-hydro-eikogene' without success."

"Well, if you have an hour to spare," said Jones, "suppose we go to your dark-room, load up a holder, make a trial exposure and develop the result; perhaps we may be able to trace the trouble and remedy the evil."

And so they went, and it was done, Smith presiding.

Result: An imageless, fogged, frilled, spotty, pin-pricked negative (?) and a look of despair on the face of poor Smith.

"Now, it's my turn," said Jones, who had watched the entire operation in silence, taking many mental "snap-shots."

He took a plate from the same box; placed it in the identical plate holder; used the same camera, exposed it on the same object, and developed the plate with exactly the same developer as that employed by Smith.

Result: A negative that produced a long, low whistle from the lips of Smith, and the remark: "It's a gem! You're a lucky dog, Jones. How else do you account for it?"

And Jones, in his frank, blunt way, thus expressed himself:

"The 'spots' are on yourself, Smith.

"In the first place, every step you take in your 'dark room' raises a cloud of dust; hence pin-holes. Your room is lighted by means of *faded* ruby fabric, which accounts for 'fog.' There is a screw missing from your camera flange, allowing a ray of light to fall on the plate, which speaks for itself. You took a plate from a 'Cramer Lightning' box, having a 'Keystone B' lid, and made a time exposure. You placed the plate in the developer, and allowed it to remain there without rocking the tray, while you replaced the dark slide of your holder, accounting for subsequent streaks. You smoked a cigarette during development, dropped its ashes in the solution, and, in an absent-minded way, relighted the weed in the middle of the operation, producing still denser 'fog.' You merely rinse the plate before placing it in the chocolate-hued hypo, thus explaining sundry stains, and finally, if I had not interfered, you would have handled a fresh plate without thoroughly washing your hypo-soaked fingers, and this negative I have just developed would have shown certain signs of 'spots.'

"Now think over this, go to work, and see if *you* do not have '*good luck.*' "

STRAY NOTES.

By Silas Gurney, Rockland, Mass.

MY work is principally outdoor views and groups. My developer is made up as follows: In 15 ounces of water I dissolve 4 ounces of sulphite of soda, 2 ounces of sal soda and 30 grains of potassium bromide. To develop I take 3 ounces of water, 1 ounce of the above soda solution and 8 grains of pyro. I aim to over rather than under time my plates, and use a little old developer. My fixing bath is hypo and water only. My washing rack for plates is made of 1½ inch oak picture moulding, 11 inches wide and as long as will work well in my sink. It is fitted with a glass back on which I place my plates, raising one end under the faucet and allowing a stream of water to flow over the plates for fifteen to twenty minutes. I always filter my hypo bath before using.

To save my silver waste from prints, I put washings into a five gallon alcohol keg that has been coated inside and out with coal tar varnish. My wash waters and fixing baths go into this barrel, and I add a cupful of potassium sulphuret solution, made by dissolving one pound of sulphuret in two quarts of water. After stirring, the precipitated matter is allowed to settle and the clear liquid siphoned off. When there is enough mud in the bottom of the keg I take it out, strain it through a cloth and send with waste paper to the refiner.

METOL AS A DEVELOPER.

By A. D. Guthrie, Edinburgh, Scotland.

HAVING given this new developing agent a thorough trial during the past season, I am inclined to think that it possesses some advantages which will greatly recommend it in preference to most of the developers now in use. One of my principal experiences with it has been in the development of kodak shutter exposures on the Eastman film, made under very adverse conditions of light. These, having been treated with all the usual developers and their combinations, were found to be considerably under-exposed, and as a last resource I tried metol in combination with potash, the formula as given by the makers, and was much pleased with its effect, details being well brought out in almost every instance and satisfactory prints made from the resulting negatives. Metol appears to have a similar effect in developing as a mixture of hydroquinone and eikonogen, but is more energetic, and I have found it a most useful adjunct to eikonogen developer when used for developing bromide enlargements and prints, giving a most pleasing tone, and compensating to some extent for any under-exposure. When used alone for the same purpose, it acts still more energetically, producing results quite equal to those obtained with ferrous oxalate. Metol seems to possess a hardening effect on the gelatine film, which must prove highly advantageous where there is any tendency to frilling, through prolonged development or any other cause.

To sum up its other properties—it is very soluble, does not stain or become discolored readily, and can be mixed with either eikonogen or hydroquinone. It is one of the best developers for rapid shutter exposures, and to those who have not as yet given it a trial I would recommend it to their notice.

HINTS FOR THE DARK-ROOM.

By H. W. Hales, Ridgewood, New Jersey.

KEEP the developing tray covered as much as possible while developing, if you wish clear, brilliant negatives. A pasteboard-box cover soaked with hot paraffin, makes an excellent cover for this purpose, answering also for a developing dish in an emergency.

If you desire dense, plucky negatives, rock the tray vigorously while developing. If you wish them thin, but full of detail, rock very gently.

Have a dish of clean water handy while developing. If the image comes up too fast, you can check it instantly by dipping in the water and rocking quickly.

Good negatives can be made with eikonogen and plenty of sulphite with no other alkali, and they will be much more vigorous and clear hereby.

Metol is an excellent developer for lantern slides and transparencies, but the development must be carried until the whites begin to discolor or they will lack density.

Negatives which come up too thin with eikonogen or metol, can be intensified by finishing development with old oxalate developer, first washing out former solution.

For bromide paper, the oxalate developer still excels, but care should be taken to rinse several times in weak acid water before washing the prints.

HYPO BATHS IN WARM WEATHER.

By W. H. Lowery, New York.

IN warm weather the hypo bath is apt to be troublesome. It rapidly evaporates, changes color and stains the negatives, and often acts deleteriously on the gelatine film. I add to my bath chrome alum and acid sulphite of soda. The bath now not only remains quite clear and clean, but clears and hardens the negative, making washing easier, in that the tendency to frill is minimized. The bath may be kept for several weeks; indeed, it may be used until it changes from a bright green color to a brownish tint. Of course, in very warm weather the bath should be kept cold by standing the tray containing it in a pan of ice water an hour or so before development is commenced. The bath I prefer is made up as follows:

Hypo	4 ounces
Chrome Alum . . . :	¼ "
Anthony's Acid Sulphite of Soda	½ "
Water	1 quart

Dissolve the hypo, add the chrome alum, filter, and add the acid sulphite. Evaporation of the bath is prevented by keeping the dish covered when not in use.

THE CAMERA IN CLOUDLAND.

By James Reuel Smith, New York.

THE venturesome foot of the discoverer, in its most rapid march, is unable to keep pace with the nimble fingers of the camerist, and it is hardly in the nature of prophecy to say that a map of the land at Naughby Naught 0° 0' 0'' north latitude, will be printed on a sensitized film a day's march, or more, in advance of any footprints on its surface.

It is a far cry, however, from here to the North Pole, and a still further one to its discovery; but there yet remains another land of

BOTTOM'S HEAD. THE RUNNING ROOSTER.

comparatively high altitude rarely prospected by the amateur photographer, though reached easily and without fear of frostbites—this is cloudland.

And it would be difficult to discover another territory where photographers can find such a wide range for their various tastes.

If those with a fad for photographing animals will seek a station with an open view of the sky, it will appear that in these degenerate days the upper air teems no less with wonders of animal life than it did when rottenness pervaded the state of Denmark, and Hamlet saw camels, whales and weasels pictured in the clouds.

That rapidest of most rectilinear lenses that was so toillessly sought by the rover, who prides himself on his collection of foreign castles, can, from the roof, be trained upon such architectural shapes of beauty as man may despair of rivaling, and proofs will follow in black and white (on carbon tissue), that the castles on the Rhine make no finer pictures than the castles in the air.

Then that well-known person, whose passion for portraiture causes his acquaintances to go up and down-town by Long Island or New Jersey routes, rather than pass within hailing distance of his domicile, may, by moving his studio to the roof, see all his friends come trooping back to admire his celestial figures and faces, some startlingly lifelike, others laughably grotesque.

Even the owner of the roller-blind shutter, set permanently at express train speed, will find congenial work, and may fill his speedy soul with joy while the flying cloud-shapes race from horizon to horizon on the track of an eighty-mile gale.

In short, he must be hard to suit who cannot pass many a pleasant hour with a camera in cloudland.

BRIDGET'S LIKENESS. BEN BUTLER.

The accompanying illustrations are photographs of photographs, both sets of negatives made with a $15 Hawkeye hand camera, from which it may be inferred that the most unpretending of tyros can derive from excursions to cloudland as much pleasure as the gentleman who writes his name between his initials, and who makes the voyage with all the luxurious accompaniments of Nicol prisms, black mirrors, and colored screens of liquid chemicals.

AN ACROSTIC.

By Emily Culverhouse, Surrey, England.

Anthony's welcome Annual, a valued book indeed,
Ne'er fails to help the amateur in times of troubled need,
Throughout the photographic world it needs no introduction,
How happy in its phases, too, of photo-reproduction.
Our votaries of art rejoice, to find in this a place
Notable and faultless, for many a pretty face,
Yields place to no work of its class, we find with joy sincere
Seven volumes of this famed text-book, adorn our shelves this year.

Investigate its letter press, for good experienced men
Naive contributions have bestowed, from ready mind and pen,
To render altruistic help to all their struggling neighbors,
Enlightening the novice in his unsuccessful labors,
Regard in this the difference, which all can plainly trace,
Nor even deem photographers a mean and selfish race.
Advantageous information they bestow on human kind,
Tout au contraire, we with regret, in most professions find,
Interesting in description, intellectual in tone,
Our new processes noted, new schemes and projects shown,
Narrated in a manner most pleasantly its own.
And read the truth to justify the tribute we would pay,
Laudatory opinions in the journals of the day.

And should we need advertisements, either to buy or sell,
No medium of publicity will serve our end so well.
No lack of useful "fin de siècle" gossip of the day,
Unequaled and unaided it bears unrivaled sway.
America or England, it is hailed by either nation,
Long may it live, and long preserve its high-class reputation.

THE CAMERA ABROAD.

By E. Sonnenbrodt, Mattapan, Mass.

FOR the benefit of American amateurs, who contemplate crossing the ocean and doing the continent, I give an experience for which I had to pay dearly. Provided with an Anthony 3¼x4¼ Bijou camera, my friend carrying a "push the button, we do the rest instrument," two of us started on a much advertised steamer, landing in Antwerp after a twelve days' trip. Plates could not conve-

NEGATIVES BY D. L. ELMENDORF

CASTOR AND POLLUX

1. WITH 4 X 5 DALLMEYER R.R. AND TELEPHOTO ATTACHMENT 2. WITH 4 X 5 DALLMEYER R.R. LENS ALONE

niently be charged on board as this was not one of the few liners carrying a dark-room for the use of photographers. Having my twelve plate-holders loaded before starting, I was able to wait without reloading until we reached Brussels. From this place we started for a trip up the Rhine, reloading at Cologne. From Coblenz, via Mainz, we reached Cassel, where again I refilled my holders. By the time we reached Breslau, the stock of plates brought from home was exhausted, and one of my holders was broken. Breslau boasts of a photographic stock-house, and here I had my holder fixed, paying $1 for the very crude repairing—a new holder costs but $1.40. I also refilled my holders, paying $2, or $1.10 more than in this country. Plates which I ordered from London, and which, by the way, were excellent, cost, including freight and duty, only 65 cents per dozen delivered in Breslau.

As for results, I am glad to state that I had better success with my Bijou than my friend had with his "push the button" camera, losing only thirteen out of one and a half gross exposures. My friend can boast of but twenty-five pictures, and he exposed four rolls of film. The Bijou was carried on a strap, like an opera-glass, and was quickly fastened to the handle of my bicycle.

Moral: Buy a good camera before you go on a trip, and carry with you an adequate supply of plate-holders and plates. The duty to be paid is very small, and is easily made up for by the fact that you will be working with material with which you are familiar.

HOW TO IMPROVE BUSINESS.

By George Kilburn, Dewsbury, England.

ONCE again the Editor requests an article for his widely circulated and popular annual. To write something new is a rather difficult task, as fresh subjects are growing more scarce each succeeding year. However, what I shall now mention, if not new, yet is worthy of notice to many of your readers, especially professional photographers, who are deploring the bad state of trade, and wishing for something whereby they might increase their income.

As a public lanternist, I have many times wondered why they do not strike out into some other branch of business and keep moving with the times. Why not turn their attention to the wants of lanternists? In the neighborhood in which I reside not one professional caters for the above class. In no part of the country with similar number of population is the lantern better patronised or more used. Yet, notwithstanding all this, not a single slide is offered for sale. If they would only take photographs of all the public buildings, exterior, and, in some cases, interior, as well as other local views, and make some slides from them, and offer them for sale, I feel sure a ready sale would accrue for them. Another class of work which is easy of manipulation, is made by covering a piece of board cut to size to suit the mount and picture to be placed thereon. Take a piece of board of suitable size ¾ or 1 inch thick, and bevel the edges off. Cut a piece of colored plush of any suitable shade, then smear the front surface of board over with a thin solution of glue, lay the board down on to the plush, turn the board over, plush side uppermost, and pat down gently with a brush; glue the edges over on the back and cover with bookbinders' cloth. Now take one of the fancy gilt-edged mounts sold by photo dealers, into which a print can be slipped and changed at will. Put a touch of glue at each corner and place down on to the plush. To finish it off, either rings for hanging or a strut to hold it up can be fixed at back. I trust that what I have mentioned may prove beneficial to those who are struggling to improve their business.

LOSSES DURING EXTRACTING OF SILVER FROM SILVER BROMIDE.

By J. Gaedicke, Berlin, Germany.

To extract the silver from collected silver bromide residues, the most simple process, as is well known, is the following: The dried silver bromide is mixed with nine-tenths of its weight of calcined soda, a crucible is filled with the mixture to about three-fourths of its capacity, and is then placed in a wind furnace. The mass will melt with considerable boiling and hissing, due to evolution of oxygen and carbonic acid gas, and then a further quantity of the mixture may be added until the crucible is almost entirely filled. The heat is now increased until the silver collects at the bottom of the crucible, while the double salt of bromide of silver and carbonate of soda, which has formed, covers it as a thin clear liquid. If the crucible is now allowed to cool down to a red heat, the silver will solidify, while the slag covering it remains still liquid and may be poured off into a large iron tray. If the crucible is now inverted, the solid silver will fall out as a handsome white button. The slag should not be thrown away, because very often it is not white, but has an intensely yellow color. In this latter case it still contains quite a considerable quantity of bromide of silver. To recover this the slag is thrown into a pail of pure water and stirred well. The mass assumes the appearance of yellow milk, due to the presence of unreduced silver bromide. This latter is allowed to settle, and is washed by decantation, when it is collected and saved for the next melting. If the slags are thrown away, some 10 per cent. of the silver will be lost.

Smaller quantities of silver haloid salts can easily be melted in an ordinary small crucible over a coke fire. Dry chloride of silver is treated in the same manner, but it is mixed with only three-quarters of its weight of calcined soda. The crucible should always rest upon a piece of a flower-pot or brick, as otherwise it is easily liable to breakage. It should also be heated somewhat before placing it in the fire.

PHOTOGRAPHING IN JERUSALEM.

By Robert E. M. Bain, St. Louis, Mo.

PHOTOGRAPHING in the towns and cities of Syria is not as difficult as one would be apt to imagine. The natives are indifferent, and the visitors absorbed by other things. In Jerusalem the narrowness of the streets, and the crowds who fill them, form the obstacle, and many interesting features of the city are frequently lost to the photographing tourist through lack of time. The features of most general interest and easiest of access, are the Mosque of Omar and its surroundings, including the Mosque of El Aksa, adjoining the Pool of Bethesda, now but a dumping-place for the refuse of the neighborhood; the Golden Gates in the wall and the Church of the Holy Sepulchre, with its many interior chapels and the alleged site of the tomb of Christ. This latter occupies the center of an immense dome, and opening on each side are the Greek, Latin and Armenian chapels. Besides this is the Hospice of the Knights of St. John, now in ruins, in the same locality, and not far away is the ancient wall of the Temple or the Jews' wailing place. This latter is the resort of the Jews, who assemble here to say their prayers and bewail the downfall of their people. A short distance from here is the Via Dolorosa, also one of the famous spots of this famous city. Along this way Christ is supposed to have passed, and the Latins have erected "stations" along the route for the benefit of the devout. Passing along this way one sees the house of Dives, and also that of Lazarus, half a block apart. Near the tower of Antonio is the Arch of the Ecce Homo, and the place from which the Scala Sancta, or Holy Staircase, was taken to be removed to Rome. This is said to be the stairway up which Christ walked to trial. Passing out of St. Stephens gate, one obtains an excellent view of the Mount of Olives and the Garden of Gethsemane across the Valley of Jehoshaphat. To the left of the gate is the tomb of a great Sheikh, surrounded by the tombs of many of his people. The Sheikh's tomb attracts attention among the thousands of tombs which surround the city, from the fact that it has a lantern hung over it, and beside it is a water jar, water bottle, ewer and some food. Near by is a small rustic shelter occupied by the native who tends the tomb and lights each night the lantern. Upon inquiry I learned that the spirit of the great Sheikh is supposed to rise at midnight of each day, and after performing his ablutions and partaking of refreshment, he addresses his spiritual followers, retiring before daylight to his grave.

Besides getting a photograph of this, I secured a negative illustrating another curious habit of the natives. Seated on one of the tombstones I found one of the more intelligent Mohammedans reading from the Koran, while seated on each side of him were other natives, all rocking back and forth. These latter I learned could not read; and, as it was necessary for them to pray, they hired the reader to pray for them, while they swung their bodies back and forth. This rocking performance is practiced by all on the idea, "With all my bones I worship thee, O God," which is contained in the book of worship.

In the Valley of Jehoshaphat I found the tomb of Absalom and several others of note, while just beyond lay the Pool of Siloam, and the Virgin's Well. The "Pool," unfortunately, is a kind of sewer, and anything but the "shady rill" we hear the choir sing about. South of this is the Mount of Offence and the Valley of Gehenna.

Traveling with a camera of large size on donkey back over the rough roads outside the city walls is not the most pleasant thing imaginable, involving, as it does, the folding up and packing away of the camera after each exposure. The most interesting point in the way of life and movement is the vicinity of the Jaffa Gate. Here all the vehicles collect, as none are allowed within the walls, and hence the place is usually crowded with camels, donkeys, wagons and people. The latter being of various nationalities, their unique costumes add much to the scene.

One can obtain several hundred pictures in and about the Holy City, and all of them most interesting, the only trouble of serious moment being to obtain the plates. For my own trip I carried with me seventy dozen of 8x10 and sixty dozen of 4x5 Cramer "Crown" plates, and while I had some difficulty in getting them in and out of the country without having them opened, the results well repaid the expenditure. The time being limited, none were developed until my return to St. Louis, but the time of exposure turned out to be correct, and the loss from breakage and other damage did not amount to 1 per cent.

THE ALTRUISM OF PHOTOGRAPHY.

By Adelaide Skeel, Newburgh, N. Y.

PROBABLY there is no amateur, of however little skill, who is not frequently called upon to take his neighbor's house, his neighbor's wife, his servant, his maid, his ox and his ass, and everything that is his neighbor's, and it is to make a plea for this enforced altruism that I write to the editors of Anthony's International Annual at the Christmas season of supposed peace and good-will to all men.

Unquestionably, a person buys a camera for his own personal use and delight, and while it is flattering to be asked to make pictures of others, there is a limit to one's patience and plates, and too often the only net return one gets for much effort is the chance remark from the recipient, "Oh, you must try again, really, you must, for those were too dreadful. What is the matter with your machine, anyway? I am sure I stood long enough. Well, I will give you another chance."

It is not within reason to expect a young beginner or an old beginner for that matter, to be able to get satisfactory views of horses, babies, interiors, pet dogs and distant mountain tops with one and the same lens, without experience or skill; nor does the bold ignorance of the undaunted amateur mend matters much, and while I, who have enjoyed more than my share of favors from people whose property I have but poorly reproduced, should be the last to complain, I may advise, I think, those setting out in the photographic life. After many failures, I formulated the following rules, not found, I believe, in any manual of instruction.

First—Always use your own machine, whose faults and virtues are familiar to you, and never be persuaded in the heat of excitement to try any one's patent shutter, or finder, or tripod, or plate-lifter, unless such inconveniences be loaned long enough before for you to experiment satisfactorily.

Second—And this is a mere platitude, but may be useful to some of my own too-anxious-to-please sex. If the subject appeals to you, take it; but if it be a horse, and you are not a horsewoman; or a sailboat, and you are not nautical; or an electric car in motion, and you are afraid of them, firmly and gently refuse. I am sure one never succeeds off-hand at these times, and a failure will be ever the undesired result.

Third—Get ready at home rather than abroad, by which I mean, fill holders, adjust tripod, when possible attach the camera, if a view camera, to the tripod, and have all your guns loaded. I was asked recently to fill my holders in the box-stall of a friend's stable, while a groom held a horse blanket over the loosely hung door. Genius may achieve great results by these chances, but ordinary mortals need all the precautions and more besides.

Fourth—Hold fast to fixed rules, and be slow to point your lens to the sun or make a too short or too long exposure, because some one's friend among the group of advisers did so on another occasion with brilliant results.

Fifth, lastly, firstly and middle—Keep cool. Devitalize, as the Delsarte teachers tell their pupils. Clutch at nothing with your hands but your button-presser or shutter release; shut your ears to all outside advice; do not try to deliver a free lecture on photography simultaneously with an object lesson, and when all is done take failure or success calmly. Success after all only means the trouble of making a dozen prints from the plate, and failure is just one more "try again."

PHOTOGRAPHY.—ART.

By Ernest Beringer, Redruth, England.

THE jealous way in which the average artists in colors reserve for their own productions the use of the word art, is a matter which has given rise to more than one leader in technical journals, and many queries to artists of great and undoubted distinction. These queries generally result in indefinite and unsatisfactory answers. Some say "Photography is purely mechanical—touch the button, the sun and chemicals do the rest;" others, "Technical—mere dexterity of manipulation, neatness, etc.;" or again, "Scientific—mere result of chemical and optical effect, but true Art? No!"

But why trouble about the definition? Photography is young, for want of knowledge and experience. What has been is gone (faded for want of a permanent process). What is to come we can only conjecture, but what we have good with us is come to stay. Platinotype and autotype promises this much. The writer has not the least doubt but that from the millions of plates exposed, prints will be taken that will outlive the producer to his lasting fame, will tell their own story and build a reputation, helping to fix photography firmly on a base of its own. This so, these photographs would be things artists would look up to with due respect.

It matters little what definition artists may choose to give to art. In itself the word has but little influence. A mason, out of marble, can raise a house, a tombstone or a monument. Photography, equally plastic—with proper manipulation—is capable of being used to construct results which shall outlive novelty of effect, fineness of texture or considerations of gloss, and even, perhaps, do its part to render necessary a new edition of a Webster's Dictionary, to absorb the words manufactured to meet its needs.

It must not be understood that the mere exposing and developing of plates in quantity is recommended, that each fluke is a credit. Each plate should be exposed for a purpose, and peculiarities studied with a view of greater improvement and power in the next.

Everything rests with the worker. Be he genius, man, or fool, his works will proclaim him and live accordingly. The works of fools die first, being so many the works of men, appreciated as they are above the average; while those of genius, obscured perhaps for a time by the average and commonplace, will eventually find their level, and show themselves over the others as clear as the sun at noon.

POSTAL PHOTOGRAPHIC SOCIETIES.

By Frederic G. Benson, York, England.

THE simplification of the processes necessary to produce a photographic picture naturally resulted in an enormous accession to the ranks of photographers, and this was quickly followed by the formation of a large number of associations, where the votaries of the once "black art" might assemble to exhibit their failures and successes, detail their experimental trials with the seemingly never ending supply of new materials and reagents, and discuss different ways of working to the best advantage the more familiar processes. Now a society cannot be formed by one or two workers, consequently photographers who lived in out-of-the-way districts, or in places where the art was not widely practiced, were debarred the benefits which accrue from association with followers of the same pursuit. This fact led to some means being devised whereby these isolated workers could be afforded at least a portion of the advantages derived by those who were fortunate enough to belong to a photographic society. The circulation of prints after the manner of the literary "Ever-circulator," was found to supply this need, and thus postal photographic societies came into being. Although primarily intended to benefit workers who were unable to join any other society, the membership is at the present time by no means restricted to that class, as the advantages of postal societies are so numerous and so distinct from those of the ordinary society, that in many instances a postal society includes in its ranks the most enthusiastic and capable members of societies in all parts of the kingdom.

A postal society can be conducted on several different lines, but practically there are but three distinct methods, the relative advantages of which I propose briefly to discuss. The most elementary plan is for the secretary or founder to provide a box or other receptacle in which each member places his prints, mounted according to his individual fancy, and on the second round substitutes a fresh picture for the one which has been circulated. In its bare unmodified form this plan has so many defects that no good purpose would be served by considering it further. The nearest modification of this plan is what I will call Class 1, and is conducted as follows: The secretary supplies each member with double sheets of drawing or cartridge paper; on one-half the slip for details of the picture is pasted, and on the other half the member affixes his photograph, by inserting the corners in small slits made for the purpose. Each time the portfolio circulates the members substitute fresh prints for those which have gone the round. If the number of members exceeds twelve or thirteen, it is necessary for the secretary to issue a portfolio at the commencement of every month, otherwise the interval which elapses between the arrival of the portfolio is not sufficiently uniform to keep up the interest of the members. One defect in this system is that the contents of the portfolios are continually changing, and it occasionally happens that a member fails to change his prints, so by the time a few have omitted this very important item, the portfolio contains a mixture of old and new work, which is not soothing to the temper or conducive to a calm and dispassionate criticism of the new prints. The one advantage of this plan is that each member is enabled to retain his own work after circulation, a somewhat important consideration when the time for photography at his disposal is limited.

Class 2 is worked on an entirely different plan. The club is limited to twelve members; the prints, with the detail slips, are sent each month to the secretary, who sticks them into an album which is then circulated in the usual manner, completing the round of the members in about a month. At the end of the year the albums are distributed among the members, and the slightly higher subscription due to the cost of purchasing the albums is more than counterbalanced by the possession of a pleasing memento of the year's work. The prints, properly mounted, show to much better advantage than when temporarily affixed to loose sheets of paper; but unless the members are all both careful and skillful (which is not always the case), prints may be inserted in the albums which, either from want of care in their preparation "go wrong," or by their lack of any picturesque qualities, detract very considerably from the value of the albums in after days. An objection to this plan is that the membership must be limited to twelve, or complications would arise in the allotting of the albums at the end of the year.

Class 3 is a combination of the two previously mentioned, and embodies some of the advantages and defects of each. The prints are sent to the secretary, as in Class 2, and are inserted by him in loose sheets, as in Class 1. This results in the portfolio going the round of the members without change, thereby avoiding the drawbacks mentioned in connection with Class 1. The task of sorting out and distributing the pictures at the end of the year to their owners, would be a very onerous one for the secretary, so they are generally made over to hospitals or other charitable institutions. This is practically the only drawback to this class of society, as it is not every one who is willing to part with from twelve to twenty of his choicest productions every year, without any return whatever.

It will be seen that in Classes 2 and 3 the post of secretary is a most arduous one, as the whole of the work of preparing the portfolios or albums falls upon him, and the success or otherwise of any club is, to a very great extent, dependent upon his ability and enthusiasm. The chances of a club's success are much enhanced when the secretary is a worker who is well known as an active and skillful photographer.

The note-books which accompany the prints on their rounds are a very important feature in postal societies. They are used for the discussion of general subjects connected with the art, and criticism of the prints sent in. In connection with this, it is astonishing how small a percentage of photographers are able to criticize intelligently the work of others, and if any society can boast the possession of even one member who has the ability and the will to point out the defects and merits of the pictures in a kindly undogmatic manner, let it rejoice thereat, for his services to the club are simply invaluable, and as this qualification does not always accompany the ability to contribute pictures regularly, it is advisable that no paltry fines be allowed to dampen that member's interest in the society.

The question of fines for neglect to contribute or for failure to forward the portfolio promptly, is one that affects societies according to the number of their members. In a society on the lines of Class 2, limited to twelve members, if a third omitted to contribute, the result would be a serious diminution in the interest attaching to the portfolio; but in a society numbering say forty members, the same proportion might very well (and, as a matter of fact, usually does) fail to contribute regularly. The imposition of small fines for every trivial non-compliance with the rules is to a certain extent irritating, and it is much better, wherever practicable, to have a sufficiently large membership to allow for occasional failures to contribute. At the same time, as the circulation of prints is the principal object for which postal societies are established, it might be well to have a rule to the effect that membership of the society is contingent on a minimum contribution of say eight months in the year.

In some societies prizes are given each month for the best pictures sent in, the question of superiority being decided either by vote of the members, or the pictures being submitted to some recognized expert. No member should be allowed to receive more than two prizes in one year. This element of competition is beneficial, in that it may in a few instances promote the sending in of good work, but in a very short time a broad line of demarcation divides the "upper circle" from those who would never, except by some fluke, stand the smallest chance of receiving any award. Further, the constant rivalry between the same individuals diminishes the interest felt when meeting fresh competitors, as in the open exhibitions so frequently held. If the members of a postal society have not sufficient enthusiasm to contribute their best work without hope of pecuniary reward, no association, even of the most skilled workers, will have a very prolonged existence.

In conclusion, a postal society containing active workers, managed by an able, enthusiastic secretary, exhibits unbounded possibilities of benefiting its members in all departments of the art science of photography.

TREATMENT OF GELATINO-CHLORIDE PAPER.

By J. H. Harvey, Melbourne, Australia.

GELATINO-CHLORIDE papers still strengthen their hold on the amateur, and are being used by an increasing number of professionals, month by month. However, some drawbacks to the working of the paper exist, which are of sufficient magnitude to deter many professionals from taking up the use of this material. The toning baths recommended are often of a very complicated nature; even in those cases in which separate toning and fixing are recommended we often see half a dozen different chemicals advocated, instead of the simple materials to which we had been accustomed when using albumenized paper.

Many object to the use of the sulphocyanide of ammonium for toning large quantities of prints on account of the unmanageable nature of the bath when first used, and the rapid reduction of its strength after the first few prints have been treated; of the overtoning of the more delicate half-tones before the deepest shadows are finished; of the stains induced by irregularities of the bath; of the want of purity of the whites, and of the large quantities of gold required by it.

The last disadvantage no sensible person would be disposed to find fault with, if he felt perfectly certain that the gold abstracted actually found its way on to the image, but that this is the case has, I think, yet to be satisfactorily demonstrated, and until it has been, we are justified in assuming that serious waste occurs somewhere. Now, there is really no reason for using a toning agent which possesses so many weak points.

First, these complicated baths all contain sulphocyanide of ammonium (that is to say, all I have seen recommended have called for its use), and the additional chemicals, which are unnecessary when other salts are used, are introduced in order to harden the gelatine, preserve the purity of the whites, etc.

If we can dispense with the sulphocyanide, we at once avoid the necessity of using these "anti-yellow" chemicals, and that it can be dispensed with, and satisfactory colors obtained without its use, is well known.

Why, then, should we continue using this troublesome and unreliable salt?

At a very early stage of my experience with these papers, I became dissatisfied with the sulphocyanide toning, and set to work, as others have done, to find a substitute. I tried carbonate of soda, borax, phosphate of soda, and tungstate of soda, but found each wanting (probably due to faulty manipulation, as others assert that they have had perfect results from all these); I then tried acetate of soda compounded according to the time-honored formula given for use with albumenized paper, and I found it works perfectly; any tone which can be obtained on albumenized paper may be obtained on the gelatine paper by the use of this salt. It works slowly enough to be easily manageable, and gives pure whites, but I have found that when used for the gelatine paper it will not keep.

If retained for any time after use, the gold becomes reduced, probably owing to the solvent action of the toning bath on the gelatine which liberates a small quantity of organic matter, and this leads to the early precipitation of the gold.

It is quite likely that much of this may be due to the quality of the water; in other localities having a different water supply the bath might keep well. I found, however, that when a print was removed from the bath at the proper point and placed in the washing water, it still retained so much of the toning solution, that by the time the washing was completed and the print ready for fixing it was overtoned. I am of opinion that this is due to the great thickness of the gelatine coating as compared with albumen. This not only enables the gelatine to retain a large quantity of the toning solution, but it necessitates more time for the washing water to penetrate, so that the action of the gold is not immediately arrested, as is the case when albumenized paper is used.

I then decided to weaken the toning bath by adding 25 per cent. more water to it, so as to render the toning slower and more under command, and thus I effected a cure.

The working of some brands of the paper becomes difficult in hot weather unless alum is used, and many object to its use. Personally I do not like it, and never use it, though my obstinacy has cost me several batches of prints. A year or two ago I tried two makes, treating them at the same time to the same baths, etc., and found that while one sample blistered and frilled tremendously, the other was proof against these evils. Of course none but the latter paper has been used since that trial.

Now, if one make of the paper can be worked without frilling, all other things being equal, another make can be produced similar, and the fact has only to be known to the makers in order to effect a change. When cracking, curling, and severance of the film from the paper are overcome, collodio-chloride paper will, I think, run gelatine very hard in hot climates, and even in temperate climates during the height of summer. As yet the collodion paper seems to be not quite so reliable; but the makers are struggling to overcome its faults, and in a few months we may find it so improved, that, unless the manufacture of gelatine paper is considerably advanced, it will be equal to the latter in most respects, and superior to it in some.

TONING.

By I. C. Johnson, Gravesend, England.

THIS is one of the difficulties that beset the young beginner in photography. An account of my own practice may be an assistance to such. I confine myself to the gelatino-chloride paper that I have used ever since it was introduced, and with which I seldom fail to obtain good results. In order to allow for some reduction in the fixing bath, I print a little deeper than the picture should appear when finished. I wash the prints in three changes of water, then immerse in the toning solution, made as follows: 1st. Water that is distilled, or rain water boiled and filtered, which is quite as good. I take 10 ounces of this and put into it 2 drams of a solution of sulpho-cyanide of ammonium, containing 7½ grains to a dram, and then add 2 drams of chloride of gold solution, one grain of the chloride to each dram, so that the 10 ounces of water contains 2 grains of chloride of gold, and will tone perfectly 18 sheets of paper, half plate size (4¾x6½), or about 550 square inches.

I prefer, however, to tone only six sheets at a time of the-half-plate size, to do which I pour one-third of the 10 ounces into a half-plate dish, and immerse two of the washed prints in it, face upward, keeping the solution moving. These two will tone in one or two minutes. Take them out and put them into a dish of clean water, and put two more in as before; these will take a longer time, say four to five minutes; take these out and put them into the dish of water, and immerse the third pair into the toning bath. These will take a still longer time, and when sufficiently toned, the solution will have parted with all its gold for toning purposes, although there will be some left in solution. I do not think it wise to put this into the bottle containing the unused solution, but prefer putting it into a bottle, and adding to it about a dram of saturated solution of protosulphate of iron. This will precipitate the gold, and gild the inside of the bottle, which gold can be afterward recovered by treating with *aqua regia.* The reason why I prefer toning only six in a batch is, the prints are so greedy of gold, that the first ones immersed take it away quickly—that is, I find by this method more prints can be toned with a given quantity of gold solution. To do this, however, the chloride of gold must be unadulterated, and for this reason I always prepare my own chloride, as described in The International Annual, 1892, vol. 5, page 68.

Now, after the toned prints have been washed in two or three waters, they should be immersed in hyposulphite of soda, 3 ounces to a pint of water, for about ten minutes, keeping them moving so that the surfaces of the prints shall be equally exposed to its action.

Wash under a tap in a large dish for about 1½ hours, when they can be dried by laying face upward on blotting paper or cards, if they are to be mounted unglazed. If they are required as enameled prints, they can at once, while wet, be squeegeed on to glass or other polished surface, and backed by pasting thick writing paper on them while on the support, and when thoroughly dry they will fall off without any trouble.

I am bold to say, that if beginners will follow these lines failure is impossible.

THOUGHTS ON SOME OF THE IMPORTANT QUESTIONS IN PHOTOGRAPHY.

By Jabez Boothroyd, Bolton, England.

SINCE I promised to write a paper for The International Annual sickness has rendered me incapable of writing. I have commenced to write at least a dozen times, but I have had to desist, being unable to concentrate my thoughts upon the subject.

On the 13th of this month I felt as though I should never be able to write again, but as the day promised to be fine, I took a trip into the country, hoping the fresh air would brace me up so as to enable me to write. I took my camera with me, that I might experiment on some of the important questions in photography, and I inclose a few prints from some of the negatives I took that day, to illustrate the remarks I am about to make. I may also state that I have received letters from some of your readers for information. I have replied to some by letter, but I thought a paper on those important points would reach them all.

The first question is light. It always appears to me that very few really know or understand what is meant by light. They seem to confound illumination with light, and do not grasp the idea that it is light which produces illumination.

Light is invisible; we cannot see it with our bodily eyes, so that to speak of white light and colored light, I think is a great mistake. Those are but the effects that light produces upon the different forms of matter, and it is the angle of reflection or refraction of light from the different forms of matter that present to our minds the different colors.

We next come to what are called light meters or light measurers.

I have stated before that I consider that such instruments are very misleading and unnecessary. These instruments when used are affected by the illuminated atmosphere, and is what is called white light, and can therefore be no indication of the effect of the light from the object photographed.

The illumination called white light affects the light meter the most strongly of all the different illuminations, blue comes next, then red, and last yellow. How then, I ask, can the effect of white light upon a light meter be any indication of the effect that light from colored objects will have upon a sensitive film? I affirm it will mislead—rather than otherwise, and will not enable the operator to obtain a correct exposure. I may ask again, is a correct exposure possible? I think not, for no object photographed can be equally illuminated, especially those objects that present so many different colors, and therefore I think that the development of the latest image is one of the most important questions to be considered.

I now come to another most important question, and which has engaged the attention of photographers for a long time, and that is color sensitive films. I have long considered that color sensitive films are quite unnecessary. I think that quite as good color values can be obtained on ordinary plates (whether glass or any other support), and if so, a long exposure will not be necessary. My experiments on the 13th were for the purpose of proving this, and I could not have had a better opportunity of testing the question than the objects to be photographed that day presented. There was every color possible, and in the most glaring conditions to necessitate color sensitiveness.

I exposed eighteen plates and got eighteen good negatives. I made my exposures under conditions to test to the utmost any plate. The tops of the trees were like burnished gold and in some places like burnished copper, and the shadows and middle tints of almost every hue, and the water reflected the sun like a mirror, yet for all that I think you will perceive from the prints that there is every detail in the trees and water, such as no color sensitive films could excel. The water also was running at a most rapid rate, yet every ripple is perfectly distinct.

I used the same stop for all the exposures (F. 64), and I gave each plate the same exposure, however highly illuminated it might be, and that was three seconds, thus proving another idea of mine that a good negative may be developed from almost any exposure.

I think you also perceive from the prints that color values are correctly expressed. The clouds, where there were any, are in the negative, but as the clouds were not so very definite, they did not show after fixing. If the clouds had been definite ones, they would have been quite distinct.

To obtain the result I have described, I back my plates with a preparation of burnt sugar. If it is put on ever so thin, and thoroughly and evenly coated, I think there need be no failure. It is very little trouble, and needs no washing off before developing.

I think if your readers will carefully study this paper, they will be enabled to avoid many annoyances which photographers often meet with.

AMATEUR HABITS.

By H. W. Studley, Rockland, Mass.

IT occurred to me that the manner most young people start out upon any new enterprise, might at least remind some one of the way they had passed a slight portion of the earlier portion of their life.

Commencing as I have concerning two youthful sketchers, it will be very easy to turn the attention upon two imaginary amateur photographers, and perhaps the combination of the two methods can be interwoven and answer for a subject to pen a few lines.

It was a happy privilege a few years ago, which I enjoyed very much—that privilege of the company of a dear friend going his rounds, delineating the many beautiful things he could see in grand old nature. That friend has since become a very fine artist. I can well remember how many times we had started, and so few times had returned without a sign of a sketch.

It would, perhaps, not be out of place at this time to explain some of our movements. Upon a bright June morning we started with pencils of numerous grades, our luncheon, sketch-books, folding stools, etc., etc. After a good long walk the village bell slowly informed us that one-half of the lovely day had run its course. Our books were closed, they had not been opened. Very soon after the sweet tones of the clock bell on the quaint little church had died away, our lunch had been eaten, and the delicious pint of pure country milk had been disposed of; we then and there decided to start afresh on our artistic errand.

After about half an hour spent in earnest argument, we accidentally came upon a fine spot; but somehow or other it was not difficult enough, it seemed too easy for students who had taken a few lessons in perspective, so that subject was left for some one else who had not studied the rules of free-hand drawing.

ENGRAVED BY PHOTO-ENGRAVING CO., N. Y.

POSING STUDY

BY McCRARY & BRANSON

It was finally decided that a sketch of everything we could see should be put on our book, with all the details. After scanning the forest, river, ledges and foreground, we talked about what kind of clouds were best fitted for a sketch of that kind (as they were passing away rapidly and new forms taking their places). All at once it was agreed upon to start for home, as the sun was getting quite low in the west, and no good subject had been selected.

This is no fancy description, every word is true. Some few years of study have passed since those two friends went on the above outing. The lessons of life have taught them to view the broad fields of lovely New England, her hills, mountains and nooks, not as a whole, but to take such parts of the whole and block them together and await the result.

What was the trouble with the first outing? An untrained mind, not an untrained hand. The trained mind within an artist sees with almost unerring certainty a picture within the bounds of almost any inclosure, because the education facilitates the faculty of taking here and there a portion until a beautiful picture has been culled. The mind that is but little exercised is apt to see the most minute detail, striving with untiring energy to put them all in, making a honeycombed or very fine wire-fence picture.

I had been urged not to hunt for too large a tract of land for a view, but to take some pretty brook with rocks and ferns or water bushes, some little rill holding beautiful art reflections, or ever so humble, as not beneath the effort of the most refined worker in the arts.

It is well to commence with some plain object, and, as your ability matures, other and more critical sections of nature will succumb to knowledge.

You cannot conquer until you see with truth first. You cannot see with truthfulness until you untiringly study nature in all her moods. Look for highest lights and heavy darks. I have not presumed to add to anything that has already been said thousands of times before, thinking, perhaps, some weary one may catch some sentence within the review and take heart, better prepared to press forward.

STEREOSCOPIC PHOTOGRAPHS BY A SINGLE CAMERA.

By J. Traill Taylor, London, England.

WHEN on a tour with a single camera one frequently sees views which can be effectively rendered only by a binocular camera. In this brief article I purpose mentioning two expedients to which resort may be had for taking stereoscopic negatives equally good and effective as those obtained with a twin lens camera. In one respect they must of necessity differ from the latter; the pictures are not taken simultaneously, and hence the subjects must partake of the still-life character unless any good-natured friends can be induced to remain stationary in the scene for thirty or forty seconds.

The problem resolves itself into the best and quickest way of shifting the position of the camera to a few inches, say from three or four, from that from which the first exposure has been made. If the camera be mounted on the tripod stand in such a way that the screw passes up much nearer to the back than the front the mere rotation of the camera on the stand, to the extent of a few degrees, will cause the two pictures, taken one after the other as quickly as possible, to be dissimilar to the extent necessary for stereoscopic effect. True, owing to the rotation, the sides of the pictures thus obtained will be dissimilar—each will contain something not seen in the other; but, unless the rotation on the stand has been abnormally great, there will be secured quite enough of similar subjects to make a good stereoscopic picture after the dissimilar portions shall have been trimmed off.

If one has a 4 x 5 camera and tries this method, taking the precaution of rotating it on the stand so that the lens is moved about three inches only from the position it formerly occupied, he will find that, although a different portion of the scene is found in the center of each negative, an excellent pair of pictures can still be obtained by suitable trimming. It would be an insult to the intelligence of the readers of this Annual were I to say that the exposure given to both negatives must be precisely identical. I possess some hundreds of excellent stereographs taken by the method described The screw by which the camera is affixed to the stand, or the axis of rotation, must be as far as possible from the lens.

A still better method than that described is a reproduction, in a slightly modified form, of the parallel bars shifting arrangement of Latimer Clarke, introduced by that gentleman in 1854. I will describe this modification so plainly as to enable any one to make it, premising that it is really an excellent and useful thing.

A small square of wood, six inches long by four and a half inches wide and three-quarters of an inch thick, is provided. In the center of this is a screw to attach it to the camera stand. This forms a table on which is screwed a piece of wood about five and a half inches long by two inches wide, to one edge of which is affixed, by means of two brass straps or bars, a similar piece of wood. These straps are each one and a half inches long, and are separated from each other four inches. They are attached to each piece of wood by a single screw, which goes loosely through holes in their ends. This arrangement, it will be readily perceived, is precisely similar to that of a parallel ruler. The camera is screwed firmly to the movable piece, which rests securely on the little table below.

When the first of the pair of pictures is to be taken the camera is moved to one side, and is shifted to the other side to take the second picture, presenting its front to the scene throughout. This gives a shift of the camera from one side to the other of three inches, which is a little more than the width between the eyes of a human being; but by increasing the length of the straps, or movable brass bars, this distance can be increased.

Of course, the dimensions above given may be varied according to taste, and for a large camera it would be desirable to increase the size of the table; I think, however, that for a half-plate camera and downward the measurements given above will prove amply sufficient. They are those determined upon by one of our Midland manufacturers as best adapted for cameras of the smaller class. It is an appliance that, while costing little, is worth much.

HALF-TONE ENGRAVING: THE PAST, PRESENT, AND FUTURE.

By M. Wolfe, Dayton, Ohio.

Instructor in Half-Tone Engraving, and Manufacturer of Fine Line Screen Plates.

LOOKING back only a few years I call to mind the time when I had made my first half-tone cuts, and taken them to the printer to have them proved. Printers those days had no use for half-tone cuts ; it took *work* to "make them ready," and their hints to me, that I had better employ my time to better advantage, were very numerous.

It was not long, however, before *they* had to toe the mark, and *learn how to print ;* the education in half-tone printing meant more skill in the "make-ready;" it meant printing ink of finer quality and having more body, and consequently more than double as expensive; finer and harder rollers, and last, but not least, a specially coated paper.

The printer rebelled against all this extra expense necessary for what to him was an untried venture. Not only did the half-tone business stir up the printer, but the paper and printing ink manufacturers as well, different firms vieing with each other in their endeavors to produce a superior article for use in the work.

To say that the progress in this branch of engraving has been phenomenal but feebly expresses it. It is only a few short years since I conceived the idea that if screens could be made and sold, as well as the process of etching, at a nominal figure, so that engravers and photographers so disposed could avail themselves of the opportunity, it would be readily adopted. As proof that I was right it is only necessary to inspect the magazines or any other publication of to-day and see the half-tone engravings that embellish the pages.

The making of the screen plates was the first great difficulty to be overcome. I remember well that the first screens I used were coarse, the finest not having over 110 to 120 lines to the inch; and for coarser work the demand was for a screen not having over 50 to 60 lines to the inch. I was the first to make and demonstrate that a screen having 80 lines to the inch was as coarse as a plate should be under any circumstances. At the present time screens from 80 to 100 lines are used for coarse, while for fine work as fine as 150 to 175 lines to the inch are used, the average working screen having 132 lines. I might say something of the manner of using screens, but in a short article like this it would be impossible to do the subject justice; there are so many considerations to be taken into account as to the separation of the screen and sensitive plate, and *why*, that to do myself justice I could only give such instruction to my students.

I have taught a good many photographers the art of engraving, but I must say it is strange to me that more of them do not take it up; the expense is only nominal, while with a little push a good business can soon be worked up, and with the improvements that have been made in the process it can be added to the regular photograph business without in the least interfering. In the etching of the copper or zinc plates there is no part but what can be readily learned by the professional photographer.

The new enamel process as now improved and adapted to copper etching is especially valuable. The copper plate, after cleaning and polishing, is coated with the sensitive enamel solution and dried, after which it is printed, then placed in water, and those parts not acted on by light and rendered insoluble are washed away; when dry the plate is held over a strong heat until the film is thoroughly baked, when it becomes a *resist* for the etching solution, which is chloride of iron. The film is also a protection to the copper plate, and if the operations have been properly conducted the film will withstand 50,000 to 75,000 (or more) impressions in the printing press without wearing through.

In the making of the negatives for half-tone engraving there is the objection to a great many that the old bath and collodion method of wet plates must be resurrected; so much the better, if the photographer only knew it. There are a great many uses the old way of working can be put to that would be much less expensive than dry plates, and with superior results; pictures to be copied, transparencies to be made, etc., in which wet plates are far better than dry.

The demand for half-tones for illustrating purposes is on the increase; the day is surely fast approaching when the newspaper without its quota of half-tone illustrations of scenes and events will not be patronized. In commercial work half-tone is rapidly displacing wood engraving; to make a fine photograph of a piece of machinery or furniture, and work up any little details not sufficiently shown, then to make a good half-tone from same, if well done, will give much better satisfaction than a wood cut, for the reason it is a *true* reproduction.

In the making of half-tones from the negative to the final etching on copper the work is of constantly increasing interest. It is a beautiful process, and added to this the fact that with energy it should be made a good paying business makes it doubly valuable. Look at the magazines of to-day. Take out the half-tones, and would they be patronized? The answer would be surely No! There is not a city or town of any importance but can boast of more or less manufactories, or publishers of fine papers or magazines, that get more or less engraving done, and who will always patronize home talent (if they can do it) before going elsewhere. The business of half-tone engraving is bound to increase; be one of the number to help build up the trade and reap the reward. A word to the wise is sufficient.

ARTIFICIAL LIGHT IN PHOTOGRAPHIC STUDIOS.

By the Editor.

"THE days of the skylight are numbered." So writes no less an authority than George G. Rockwood. This may seem a bold prophecy, and yet we believe it to be a true one. It will be urged that the same cry has been raised before. Maybe it has, but with each epoch, progress has been made and to-day the prospects are very bright, that artificial lighting will be adopted in all progressive galleries. The question may be asked: Why bother with artificial lighting, when we have the sun? Why bother with railroads when we have legs? Why make progress in any direction? The advantage of an efficient artificial light cannot be overestimated. The photographer nowadays, unless a man of considerable capital, must locate his business in a building where a skylight is already built. Choice of location is practically denied him. Such special buildings being comparatively scarce, rents are high and landlords capricious. Again, the skylight may not be in a proper position, may be too small, and is always leaky. In summer, special whitewashing or other coating is necessary, and in winter a sufficiency of light is hardly obtainable. Add to this the fact that such galleries must be at the top of the building, and the consequent inconvenience to customers, and the advantages of a system capable of being used in any location is evident. The photographer never uses daylight as a source of illumination for the dark-room, because of its everchanging quality. Similarly, in the studio, correct exposure is only possible when the light is constant in actinic power.

The *fin de siècle* studio will be on the ground floor, with reception room and show-room in front, dressing room and operating room next, and dark-room and printing rooms in the rear. The whole place will be lighted with electricity, will be cooled in summer with electric fans and heated in winter by electricity. Electricity will furnish the motive power for the retouching pencil, will open and close the shutter, will, in fact, be pressed into service wherever possible.

The use of the electric light in photography is not by any means a recent introduction. For many years efforts have been made to secure an apparatus, which, working at a low cost, would furnish a steady, constant adequate light. Engines and dynamos were required in the past, but to-day, when electricity may be obtained from the street with as much ease as gas, there is really no obstacle in the way of its adoption. The incandescent light has been tried in the past, and is to-day being sold in Europe, a series of lamps being strung around the edge of a parabolic reflector. But the arc light, from a lamp with a proper automatic feed, would seem to be the most perfect light for this work, and experiments made during the past year have demonstrated fully that the electric arc light, properly used, is not only superior to daylight, because of its constancy and adaptability, but gives results that cannot be equalled under the ordinary skylight. And why should this not be? Not only are the sitter and the screens at the disposal of the operator, but the source of the light is absolutely under his control. In many of the leading galleries of America the electric light is now in use, and from all we hear nothing but the highest praise of this system. It is, of course, essential that the light shall be of sufficient power and absolutely necessary that it shall be steady. Special apparatus for this work is now manufactured in America and England, and with either make wonderful results may be achieved.

The light is not thrown directly on the sitter. We have done this in making ferrotypes, and have cut down the exposure very considerably. But for general photographic work, the direct light is screened from the subject, who is lighted by reflected light only. The necessary apparatus consists of background, head-screen, large reflecting screen and smaller double reflecting screen for that side of the sitter remote from the lamp. The large reflecting screen has a projecting top, and the top and side light of the ordinary gallery may thus be reproduced. Any and every effect possible with the skylight may be reproduced with this combination. The exposure required is not more than with daylight, and the uniformity of results is certain.

For large groups two or more lamps may be found necessary. We have successfully photographed groups of ten to twelve persons with one lamp. But where artificial lighting is adopted exclusively, a flashlight machine of proper caliber should be included as a very necessary part of the outfit. For large groups, and for work away from the gallery, such a piece of apparatus will be found of the greatest service. With such an instrument as the Williams flash machine anything is possible, and the photographer, whose gallery is equipped with an electric light apparatus and the flash machine, can successfully cope with any subject. Artificial lighting is here to stay, and he who realizes this, and is among the first to avail himself of its advantages, will profit by it at the expense of his less progressive brethren.

PRINTED ON
AMERICAN ARISTO PAPER.

NEGATIVE ON
CRAMER PLATE.

STUDIO WORK

BY

D. R. COOVER,

Tables and Formulas.

DEVELOPERS.

PYROGALLOL.

CRAMER'S

Alkaline Solution.

Water	60 ounces	or	1800 c.c.
Carbonate of sodium crystals (sal soda)	5 "	"	150 grams.
Sulphite of sodium crystals	10 "	"	300 "

A smaller quantity of sulphite will produce a warmer tone, a larger quantity a gray or bluish black tone.

The alkaline solution must be kept in well stoppered bottles.

If the negatives show yellow stain, make a fresh solution, or try another lot of sulphite of sodium.

For hydrometer test see note below.*

Pyro Solution.

Distilled or pure ice water	6 ounces	or	180 c.c.
Sulphuric acid	15 minims	"	1 c.c.
Sulphite of sodium crystals	1 dram.	"	4 grams.
Pyrogallic acid	1 ounce	"	30 "

All pyro solutions work best while fresh.

Eight grains dry pyro may be substituted for 1 drachm of this solution.

Mix in the following proportions:

Pyro solution	1 drachm	or	10 c.c.
Alkaline solution	1 ounce	"	80 c.c.
Tepid water (for winter use)	2 ounces	"	160 c.c.
OR:			
Cold water (for summer use)	3 to 5 ozs.	"	240 to 400 c.c.

If the high lights are flat, use more pyro solution.

If they are too intense, use less pyro solution.

For Aristo negatives about one-half the quantity of pyro solution will be sufficient.

If too little pyro is used, the alkali will be in excess and cause fog.

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*The alkaline solution can be made with the hydrometer by mixing equal parts of the following solutions:

Carbonate of sodium solution....(hydrometer test 40).
Sulphite of sodium solution.....(hydrometer test 80).

For negatives of great contrast, suitable for line engraving, use double the quantity of pyro solution, and add sufficient bromide of potassium solution to keep the lines perfectly clear.

For Transparencies.

Water	64	ounces.
Sulphite of soda	8	"
Carbonate of soda (crystals)	$2\frac{1}{2}$	"
Bromide of potassium	30	grains.

To every ounce of this solution add 3 to 5 grains of dry pyro. An excess of pyro will yield slides too heavy in the shadows and lacking in detail in the high lights.

CARBUTT'S.

No. 1.

Pyro Stock Solution.

Distilled or ice water	10 ounces	or	300	c.c.
Oxalic acid	15 grains	"	1	gram.
Bromide of potassium	30 "	"	2	"

Then add Schering's pyro 1 ounce (30 grams), and water to make 16 fluid ounces (480 c.c.).

No. 2.

Stock Soda Solution.

Water	10 ounces	or	300	c.c.
Sodium sulphite (crystals)	4 "	"	60	grams.
Soda carb. crystals (or dry gran. 1 ounce)	2 "	"	60	"
Potash carbonate	1 "	"	30	"

Dissolve, and add water to make measure 16 fluid ounces (480 c.c.)

No. 3.

Bromide Solution.

Bromide of sodium or potassium, $\frac{1}{2}$ ounce (14 grams). Water, 5 ounces (150 c.c.).

For Developer.

Dilute 2 ounces of stock No. 2 with 7 ounces of water for cold weather, and 10 to 12 of water in summer. To 3 ounces of dilute No. 2 add $1\frac{1}{2}$ to $2\frac{1}{2}$ drachms (6 to 10 c.c.) of No. 1. The more pyro the denser the negative, and *vice versa*. No yellowing or fogging need be apprehended if the directions are followed. Development should be continued until the image seems almost buried, then wash and place in fixing bath.

For Instantaneous Exposures take for a 5x8 or 6½x8½ plate 3 ounces of dilute No. 2. Lay the plate to soak in this, and cover pan. Put 2 drachms of No. 1 into the graduate, and 3 drops of bromide solution. Pour the soda solution off of the plate into the pyro and back over the plate; let development proceed, and examine occasionally. Keep solution in gentle motion over the plate. A *very* short exposure may take ten minutes to fully develop. If the image is not fully brought out this time, add to developer in pan three times its bulk of water, and let plate lie in it covered for half an hour or more if necessary, until full development is attained, then wash, and proceed as directed under head of developer.

Hammer.

Solution No. 1.

	Avoir.
Pure water	16 ounces.
Sulphite of sodium (crystals)	4 "
Oxalic acid	20 grains.

Dissolve, and add

Pyrogallic acid	1 ounce.

Solution No. 2.

Pure water	16 ounces.
Sulphite of sodium (crystals)	4 "
Carbonate of sodium (crystals)	4 "

For use, take ½ ounce of each, No. 1 and No. 2, and 5 to 8 ounces tepid water in cool or cold weather, or 6 to 12 ounces cold water in warm weather.

Make stock solution of sulphite of soda to test 60 by hydrometer. Allow to settle perfectly clear.

No. 1.

Sulphite of soda solution, 60 test	18 ounces.
Oxalic acid	20 grains.
Pyrogallic acid	1 ounce.

No. 2.

Equal parts of sulphite of soda solution testing 60, and carbonate of soda solution testing 60.

To develop, take 1 ounce of No. 1, 2 ounces of No. 2, and 10 to 16 ounces tepid water in cool or cold weather, or 12 to 24 ounces cold water in warm weather.

Wuestner.

No. 1.

Sulphite of soda (crystals)	16 ounces	or 448 grams.
Sulphuric acid	10 drops	
Pyrogallic acid	2 ounces,	" 56 "
Water	84 "	" 2355 c.c.

No. 2.

Sal soda (crystals)	8 ounces	or 224 grams.
Water "	84 "	" 2355 c. c.

To develop, take 2 ounces of No. 1, 2 ounces of No. 2 and 8 ounces of water.

Seed.

Make stock solution of sulphite of soda to test 60 with hydrometer, allow to settle perfectly clear, then take:

Sulphite of soda solution	16 ounces.
Pyro	1 "
Sulphuric acid	15 drops.

(or oxalic acid, 10 grains.)

No. 2.

Sal soda solution, hydrometer test 40.

To develop, take.

Water	12 ounces.
No. 1	1 "
No. 2	1 "

In warm weather use more water, in cold weather less.

Excelsior.

No. 1.

Ice or distilled water	16 ounces.
Sulphite of sodium (crystals)	6 "
Oxalic acid	15 grains.

Dissolve, and then add 1 ounce pyro.

No. 2.

Ice or distilled water	16 ounces.
Carbonate of soda (fresh crystals)	4 "

For Use.

Take 6 ounces of cool water (not ice cold) and ½ ounce each of No. 1 and No. 2. When the developer is fresh it answers best for short exposures. After having been used once or twice it will work with more contrast and clearness.

AMERICAN.

No. 1.

Sulphite of soda (crystals)	60 grains.
Sulphuric acid (c. p.)	15 minims.
Pyrogallic acid	1 ounce.
Water	6 "

No. 2.

Sulphite of soda (crystals)	2 ounces.
Sal soda	1 "
Water	40 "

To develop, use 1 drachm of No. 1 and 4 ounces of No. 2. For more intensity use more of No. 1. For more detail use more of No. 2.

FITCH'S.

Water	10 ounces.
Bromide of ammonium	30 grains.
Ammonia. 880	60 minims.

Developer.

To each ounce of above add for use 1 to 2 grains dry pyro.

EASTMAN (for films).

Pyrogallic Acid Solution.

Pyrogallic acid	½ ounce.
Nitrous or sulphurous acid	20 minims.
Water	32 ounces.

Soda Solution.

Sulphite of soda (crystals)	6 ounces.
Carbonate of soda (crystals)	4 "
Water	32 "

To develop, take pyro solution, 1 ounce ; soda solution, 1 ounce ; water, 2 ounces.

HYDROQUINONE.

Carbutt

A.

Warm distilled water	20 ounces	or 600 c.c.
Sulphite soda (crystals)	4 "	" 120 grams.
Sulphuric acid	1 drachm	" 4 "
Hydrochinon	360 grains	" 23½ "
Bromide potass.	30 "	" 2 "
Water to make *up to*	32 ounces	" 960 c.c.

B.

Carbonate potash	2 ounces	or 60 grams.
Carbonate soda (crystals)	2 "	" 60 "
Water to make	32 "	" 960 c.c.

C.

Accelerator.

Caustic soda	1 ounce	or 30 grams.
Water	10 ounces	" 300 c.c.

For under-exposure add a few drops of above to developer.

D.

Restrainer.

Bromide potass.	½ ounce	or 14 grams.
Water	5 ounces	" 150 c.c.

To Develop.

For instantaneous exposures, take—*A*, 1 ounce or 30 c.c.; *B*, 1 ounce or 30 c.c.; *water*, 4 ounces or 120 c.c.

For portraits—*A*, 1 ounce or 30 c.c.; *B*, 1 ounce or 30 c.c.; *water*, 5 ounces or 150 c.c.

For landscapes (Sen 20–27)—*A*, 1 ounce or 30 c.c.; *B*, ½ ounce or 15 c.c.; *water*, 3 ounces or 90 c.c.

For landscapes, full exposure (Sen 16–20)—*A*, 1 ounce or 30 c.c.; *B*, ¾ ounce or 25 c.c.; *water*, 4 ounces or 120 c.c.

For lantern slides—*A*, 1 ounce or 30 c.c.; *B*, ¾ ounce or 25 c.c.; *water*, 4 ounces or 120 c. c.

For lantern slides and full exposures—*A*, 1 ounce or 30 c.c.; *B*, ¾ ounce or 25 c.c.; *water*, 4 ounces or 120 c.c.; and 2 to 6 drops Restrainer *D* to each ounce of Developer. (See below.)

Note.—More of *A* will increase density, more of *B* will increase detail and softness. Temperature of developer should not vary much below 65 degrees nor above 75 degrees. The after-treatment is the same as with any other developer.

Wuestner.

For Transparencies and Lantern Slides.

Sulphite of soda (crystals)	125 parts.
Hydroquinone	12 "
Lithium carbonate	10 "
Water	1,000 "

Seed.

A.

Hydrochinon	1 ounce.
Sulphite of soda (crystals)	5 ounces.
Bromide of potassium	10 grains.
Water (ice or distilled)	55 ounces.

B.

Caustic potash	180 grains.
Water	10 ounces.

To Develop.

Take of *A*, 4 ounces; *B*, ½ ounce. After use pour into a separate bottle. This can be used repeatedly and with uniformity of results by the addition of one drachm of *A* and 10 drops of *B* to every 8 ounces of old developer.

In using this developer it is important to notice the temperature of the room, as a slight variation in this respect causes a very marked difference in the time it takes to develop, much more so than with Pyro. Temperature of room should be from 70 to 75 degrees Fahr.

Byk's.

Hydroquinone	5 grams.
Potassium carbonate	75 "
Sodium carbonate	40 "
Water to make	1,000 "

Mix in reverse order.

Developer.

Use full strength.

DR. JUST'S.

No 1.

Hydroquinone	10	parts.
Sulphite of sodium	60	"
Distilled water	240	"

No. 2.

Carbonate of potassium	120	parts.
Acetic acid	15	"
Distilled water	480	"

Developer

Mix the solution in equal parts for use. The best results are obtained by commencing development with an old or once-used developer, and, when development is half completed, applying fresh.

MIETHE.

No 1.

Sulphite of soda	35	grams.
Yellow prussiate of potash	30	"
Hydroquinone	7	"
Water	550	c.c.

No. 2.

Caustic potash	30	grams.
Water	550	c.c.

To develop, use 3 parts of No. 1, and 2 to 3 parts of No. 2, according to exposure and desired density.

EDWARD'S.

Carbonate of sodium (granulated)	100	grains.
Sulphite of sodium (crystals)	480	"
Hydroquinone	100	"
Water	14	ounces.

Developer.

Use full strength.

EIKONOGEN DEVELOPER.

CRAMER.

No. 1.

		Troy Weight			
Distilled Water	Hydrometer	40	ounces	or	1200 c.c.
Sulphite of sodium (crystals).	test 15.	2	"	"	60 grams.
Eikonogen		1	"	"	30 "

Boil for a few minutes. After cooling, pour into a bottle and keep it well stoppered.

No. 2.

Water	10 ounces	or	300 c.c.	
Carbonate of potassium	1	"	"	30 grams.

For Use.

Solution No. 1	3 ounces	or	90 c.c.
Solution No. 2	1 "	"	30 c.c.

In hot weather dilute with an equal quantity of cold water. This developer can be used repeatedly by occasionally adding more of Solution No. 1 and 2.

To obtain thin negatives, full of detail, such as are required for printing on Aristo paper, use the developer more diluted.

For negatives of greater intensity add to Solution No. 1:

Hydrochinon........................1 drachm or 4 gram.

WUESTNER.

No. 1.

Distilled or ice water	80	ounces	or	2400 c.c.
Sulphite of soda (crystals)	3½	"	"	115 grams.
Oxalic acid	1	dram	"	4 "
Eikonogen	2½	ounces	"	75 "
Yellow prussiate of potash	½	ounce	"	15 "

No. 2.

Distilled or ice water	20	ounces	or	600 c.c.
Carbonate of potash	2	"	"	60 grams.

Developer.

Take 4 ounces of No. 1 and ½ ounce of No. 2.

SEED.

Make stock solution of sulphite of soda 40 by hydrometer test.

No. 1.

Hot water..................................30 ounces.
Eikonogen..................................1 "

Thoroughly dissolve, then add:

Sulphite of soda solution..........................10 ounces.

No. 2.

Sal soda, 12 hydrometer test.

To develop, take equal parts of Nos. 1 and 2; water, 1 ounce.

If more contrast is required, increase the amount of No. 1; if less, more of No. 2. The developer can be used repeatedly by adding each time a little of each of fresh solutions Nos. 1 and 2, according to above proportions.

Hammer.

Solution No. 1.

Pure hot water..45 ounces.
Sulphite of sodium (crystals)...................... 3 "

Dissolve, and add

Eikonogen.. 1 "

Boil five minutes; when cool, filter.

Solution No. 2.

Pure water..15 ounces.
Carbonate of potassium............................$1\frac{1}{2}$ "

For use, take three parts of solution No. 1 and one part of solution No. 2.

Make stock solution of sulphite of soda 40 by hydrometer.

No. 1.

Hot water...30 ounces.
Sulphite of soda solution (40 hydrometer test).......10 "
Eikonogen.. 1 ounce.

To develop, take Nos. 1 and 2, equal parts.

No. 2.

Carbonate of soda solution (12 hydrometer test).

Bromide Solution.

Pure water..10 ounces.
Bromide of potassium................................ 1 ounce.

When the developing solution is quite new, it may be necessary to add to it 6 to 12 drops of the bromide solution, to make it work perfectly clear.

Excelsior.

No. 1.

Hot water (ice or distilled)..........................20 ounces.
Sulphite of soda (crystals)........................... 1 ounce.
Eikonogen.. $\frac{1}{2}$ "

No. 2.

Water (ice or distilled)..............................15 ounces.
Carbonate of potass.................................. 1 ounce.

For Use.

Take 4 ounces of No. 1 and 2 ounces of No. 2.

Use the old developer repeatedly, adding, as is required, a little more of No. 1 and No. 2 in the same proportions as before.

AMERICAN.

No. 1.

Sulphite of soda (hydrometer test 30).............	40 ounces.
Eikonogen....................................	1 ounce.

No. 2.

Potassium carbonate to test 10°.

To develop, use equal parts. For more contrast use more of No 1. For more detail use more of No. 2.

EIKONOGEN AND HYDROQUINONE DEVELOPER.

CARBUTT'S.

A.

Distilled water..............................	20 oz.,	or	600 c.c.
Sulphite of soda (crystals)...................	4 oz.,	"	120 gram.
Eikonogen....................................	330 gr.,	"	22 "
Hydrochinon..................................	160 "	"	$10\frac{1}{2}$ "
Water to make *up to*........................	32 oz.,	"	960 c.c.

B.

Distilled water..............................	20 oz.,	or	600 c.c.
Carbonate of potash..........................	2 "	"	60 gram.
Carbonate of soda (crystals)..................	2 "	"	60 "
Water to make *up to*........................	32 "	"	960 c.c.

To develop, see Carbutt's Hydroquinone Developer.

SEED.

No. 1.

Water..	12 ounces.
Sulphite of soda.............................	720 grains.
Eikonogen....................................	144 "
Hydroquinone.................................	48 "

No. 2.

Water..	12 ounces.
Carbonate of potash..........................	192 grains.

For use, half of each.

EXCELSIOR.

Solution A.

Sodium sulphite, granular	240 grains.
Sodium carbonate, dry	120 "
Distilled water	6 ounces.

Solution B.

Eikonogen	100 grains.
Hydroquinone	80 "
Distilled water	6 ounces.

For use, use ½ ounce each of *A* and *B* to 3 ounces of water.

FERROUS OXALATE.

WUESTNER.

Neutral oxalate of potash, saturated solution. Protosulphate of iron, sat. sol. 10 drops sulphuric acid.

To develop.

Oxalate solution	10 ounces.
Iron solution	2 "
Old (used) developer	2 "

METOL.

CRAMER'S.

Water	25 ounces.
Sulphite of sodium (crystals)	2½ "
Metol	3 drachms
Bicarbonate of soda	1 ounce.

Bromide of potassium solution a few drops, if necessary.

Dissolve in the given rotation.

This developer keeps well, and as the bicarbonate of soda is a very mild alkali, it is not liable to injure the film.

Water	20 ounces.
Carbonate of soda (crystals)	300 grains.
Sulphite of soda	500 "
Hydrochinon	30 "
Metol	30 "

For use, add equal amount of water.

For Transparencies.

Water	40 ounces.
Carbonate of soda (crystals)	360 grains.
Sulphite of soda (crystals)	500 "
Hydrochinon	30 "
Metol	30 "

Dissolve the carbonate and sulphite and then add the hydrochinon and metol.

Clearness is the first requisite in a good lantern slide.

BLAIR.

Solution No. 1.

Water	30 ounces.
Metol	105 grains.
Sulphite of soda (crystals)	$2\frac{3}{4}$ ounces.

Solution No. 2.

Water	30 ounces.
Carbonate of potash	$2\frac{3}{4}$ "

Mix each solution in the order given, viz. :—

Solution No. 1. Dissolve 105 grains metol in 30 ounces of water; after thoroughly dissolved add $2\frac{3}{4}$ ounces sulphite of soda.

Filter through absorbent cotton in a funnel.

Solution No. 2 is treated in the same manner.

To develop, take equal parts of No. 1 and No. 2 in a quantity sufficient to make the solution about half an inch deep in the developing tray.

The following conditions are peculiar to the film during development with this developer. The image will appear in from three to five seconds if the plate is fully timed, but the film should be developed until the high lights are very intense, as the negative will fix out more than it would if developed with any developer now in general use.

WUESTNER.

Metol	75 grains.
Sodium sulphite (crystals)	1 ounce.
Potassium carbonate	$\frac{1}{2}$ "
Water	10 "

CLYCIN.

EDER.

Glycin	5 parts
Sodium sulphite	15 "
Potassium carbonate	25 "
Water	90 "

For use, dilute with 3 to 4 volumes of water.

FIXING BATHS FOR PLATES.

LABORIE'S.

Bisulphite of soda	100 grams
Hyposulphite of soda	150 "
Water	1,000 c.c.

CARBUTT'S.

Sulphuric acid	1 drachm	or	4 c.c.
Hyposulphite of soda	16 ounces	"	480 grams
Sulphite of soda	2 "	"	60 "
Chrome alum	1 "	"	30 "
Warm water	64 "	"	1,920 c.c.

Dissolve the hyposulphite of soda in 48 ounces (1440 c.c.) of water, the sulphite of soda in 6 ounces (180 c.c.) of water, mix the sulphuric acid with 2 ounces (60 c.c.) of water, and pour slowly into the sulphite of soda solution, and add to the hyposulphite, then dissolve the chrome alum in 8 ounces (240 c.c.) of water and add to the bulk of solution, and the bath is ready. This fixing bath will not discolor until after long usage, and both clears up the shadows of the negative and hardens the film at the same time.

After negative is cleared of all appearance of silver bromide, wash in running water for not less than half an hour to free from any trace of hypo solution. Swab the surface with wad of wet cotton, rinse, and place in rack to dry spontaneously.

AMERICAN.

Citric acid	160 grains
Hyposulphite of soda	1 pound
Water	32 ounces

First dissolve the citric acid, add the hypo and allow to settle.

CRAMER'S.

The negatives may be fixed in a plain hypo bath, 1 part hyposulphite of soda to 4 parts of water, but the following bath is especially recommended.

Prepare two solutions.

No. 1.

Hyposulphite of soda	32 ounces	or	1 kilo.
Water	3 quarts	"	3 liter.

No 2.

Water	1 quart	or	1 liter.
Sulphuric acid	$\frac{1}{2}$ ounce	"	15 c.c.
Sulphite of sodium (crystals)	4 "	"	120 grams.
Chrome alum	3 "	"	90 "

After the ingredients are dissolved pour No. 2 solution into No. 1. During the cold season one-half the quantity of No. 2 is sufficient.

DEFECTS IN NEGATIVES.

FOGGY NEGATIVES.—Over-exposure; white light entering camera or dark-room; too much light during development; decomposed developer; presence of hypo or silver nitrate in the developer; too warm developer or too much carbonate of soda and potassium without bromide.

WEAK NEGATIVES WITH CLEAR SHADOWS.—Under-development.

TOO STRONG WITH CLEAR SHADOWS.—Under-exposure.

WEAK NEGATIVE WITH PLENTY OF DETAIL IN THE SHADOWS.—Over-exposure with too weak developer.

TOO MUCH INTENSITY.—Developer being excessively strong or too warm.

FINE TRANSPARENT LINES.—Using too stiff a brush in dusting off plates.

ROUND TRANSPARENT SPOTS.—Air bubbles in the developer.

TRANSPARENT SPOTS OF IRREGULAR SHAPE.—Caused by dust. Keep the camera and cabinet free from dust and brush off the plate carefully before placing in the holder.

YELLOW COLORED NEGATIVES.—Decomposed pyro solution, insufficient or decomposed sulphite of sodium in developer.

YELLOW AND BROWN STAINS, IRIDESCENCE OF THE SURFACE.—Caused by using the developer warmer or stronger in alkali than the plate will stand, also by plain hypo solution, which, by continued use, has assumed a dark color, or by insufficient fixing. The stain may be removed by applying a reducing solution and the iridescent surface can be wiped off with a tuft of cotton while the negative is wet.

Mottled Appearance of Negative.—Precipitation from the fixing bath containing alum, if the solution is old or turbid.

Crystallization on the Negative and Fading of Image.—Imperfect elimitation of the hypo.

To Clean Negatives Stained by Silver.

Take a plug of cotton-wool and wet it well with a weak solution of cyanide of potassium; rub gently all over the negative, using a little more force on the stained parts. Well wash. Dry on blotting-paper. If necessary to revarnish, flood the plate once or twice with methylated spirit. Let dry, and then varnish in the ordinary way.

Soaking Solution for Films.

Blair.

Alcohol	4	ounces.
Glycerine	½	"
Water	16	"

Eastman.

Water	32	ounces
Glycerine	1	"

To Strip Film from Ordinary Plates.

Give negative two coats of 2 per cent. collodion. The following formula yields good results.

Negative cotton	30 grains	or 2 grams.
Ether	1 ounce, 6 dr.	" 50 c.c.
Alcohol	1 " 6 "	" 50 c.c.

Allow the first coat to dry before applying the second, and when second coating has set, place immediately in cold water until greasiness has disappeared, then place in a bath of

Sodium fluoride (com)	5 drams.	or 20 grams.
Water	5 ounces	" 160 c.c.

When thoroughly saturated with this solution, which will take at least an hour, place without washing in

Water	7 ounces	or 196 c.c.
Sulphuric acid	1 dram.	" 4 c.c.

Rubber trays should be used for this and the fluoride bath. When film begins to loosen, lay a piece of writing paper or celluloid upon it as a support, and separate the two from the glass. After washing well under tap it can be transferred to a permanent support.

The following will answer the purpose: Coat a clean glass plate which has been rubbed with French Chalk and dusted, with

Gelatine	$2\frac{1}{2}$ ounces or	75 grams.
Water	16 "	" 500 c.c.
Glycerine	3 drams.	" 10 c.c.

Filter before coating through canton flannel and avoid air bubbles. Coat on a leveling stand as thick as the plate will hold, allow to set and dry.

Clearing Solution to Remove Yellow Stain Caused by Developer.

Sulphate of iron	3 ounces or	90 grams.
Sulphuric acid	1 "	" 30 c.c.
Alum	1 "	" 30 grams.
Water	20 "	" 600 c.c.

First well wash to remove all hypo from negative, then immerse in the above solution until the stain is removed; again wash well and dry.

Intensifying Solutions.

Cramer's.

Prepare a saturated solution of bichloride of mercury in water and pour of this a sufficient quantity gradually into a solution of

Iodide of potassium	$1\frac{1}{4}$ ounce or	50 grams.
Water	6 "	" 250 c.c.

until the point is reached when the forming red precipitate wili no longer dissolve by shaking; but be careful not to add more mercury than just enough to make the solution *very slightly* turbid. Now add

Hyposulphite of soda	1 ounce or	40 grams.
Dissolve and add water to make 20 ounces solution		800 c.c.

For use, this should be diluted with about three parts of water. If the plate has not been thoroughly fixed, the intensifying solution will produce yellow stains. Be careful not to overdo the intensifying. Should it have gone too far, the negative can be reduced by placing it in the fixing bath for a short time.

Scolik.

The fixed and well-washed negative is allowed to remain in the following mercuric chloride bath until the film is thoroughly whitened:

Bichloride of mercury	1 part,
Potassium bromide	1 "
Water	50 "

The bleaching being complete, the mercuric solution is rinsed off, and the negative is immersed in a mixture of equal parts of saturated solution of sodium sulphite and water; the darkening action will be seen to take place steadily and slowly, just as when ammonia is used. Wash away the excess of sulphite.

Carbutt.

Intensification.

With correct exposure and development, intensification need never be resorted to. The following formula is, however, very effective, and the most permanent of all methods:

No. 1.

Bichlor. mercury	240 grains or 16 grams.
Chloride of ammonium	240 " " 16 "
Distilled water	20 ounces " 600 c.c.

No. 2.

Chloride of ammonium	240 grains or 16 grams.
Water	20 ounces " 600 c.c.

No. 3—*Cyanide Silver Solution.*

Distilled water	6 ounces or 180 c.c.
Cyanide potass. C. P.	60 grains " 4 grams.
Distilled water	2 ounces " 60 c.c.
Nitrate of silver	60 grains " 4 grams.

Pour the silver into the cyanide solution while stirring, and mark bottle POISON.

Let the plate to be intensified wash for at least half an hour, then lay in a 5 per cent. solution of alum for ten minutes, and again wash thoroughly; this is to insure the perfect elimination of the hypo. The least trace of yellowness after intensifying shows that the washing was not sufficient.

Flow sufficient of No. 1 over the negative to cover it, and allow to either partially or entirely whiten; *the longer it is allowed to act the more intense* will be the result; pour off into the sink, rinse and flow over No. 2, and allow to act one minute; wash off, and pour over or immerse in No. 3 until changed entirely to a dark brown or black. No. 3 can be returned to its bottle, but Nos. 1 and 2 had better be thrown away. Wash thoroughly and dry.

American.

No. 1.

Bichloride of mercury	31 grains.
Water	4 ounces.

No. 2.

Sulphite of soda (crystals)	154 grains.
Water	3 ounces.

The negative is laid in No. 1 until intensified sufficiently and washed thoroughly, then put in No. 2, when it returns to the original color. Wash for one-half hour and dry.

Forbes'.

Place the fixed and washed negative in a half saturated solution of mercuric chloride. Allow it to remain until the image is quite weak and the plate of a gray color. Wash thoroughly in running water; then immerse in dilute ammonia water, 1 part strong ammonia water to 9 parts water. The negative will quickly change and become dark. Let it remain in the ammonia until the desired intensity is attained; then thoroughly wash and dry.

REDUCING SOLUTIONS FOR NEGATIVES.

Dissolve 1 part red prussiate of potash in 15 parts of water. Wrap the bottle in yellow wrapping paper, as the solution is affected by light and will not keep long. Immerse the negative in a hypo solution—1 part hypo to 15 parts of water—to which has been added a little of the above immediately before use. When reduced sufficiently, wash thoroughly.

Cyanide Reducing Solution.

Cyanide of potassium	20 grains.
Iodide of potassium	10 "
Bichloride of mercury	10 "
Water	10 ounces.

Reduction takes place slowly and is easy to control. After reducing, the negative should be washed thoroughly.

No. 1.

Hyposulphite of soda (crystals)	772 grains.
Water	8 ounces.

No. 2.

Ferricyanide of potassium	76 grains.
Water	6 drams.

To Reduce, Use

No. 1, 5 ounces; No. 2, 2 drachms.

Potassium ferricyanide	1 ounce or 30 grams.
Distilled or melted icewater	16 fluid ounces or 500 c.c.

Keep the above solution in the dark when not in use. To reduce a negative immerse it in a hypo solution of a strength of about one ounce of hypo to a pint of water, to which a small quantity of the reducing solution has been added. To reduce locally, immerse the plate for a few minutes in water and apply the mixed solution with a camel's hair brush to the part required. Silver stains may also be removed after wetting the plate by brushing them over with the solution. At the end wash thoroughly. The ferricyanide solution must be added to the hypo at the time of using, as the mixed solutions do not keep.

Perchloride of iron	30 grains.
Citric acid	60 "
Water	1 pint.

ORTHOCHROMATIC SENSITIZING BATHS.

VICTOR SCHUMANN.

Distilled water	200 parts.
Alcohol	10 "
Ammonia, .900	4 "
Alcoholic solution of cyanine (1.200)	10 "

Immerse the plate in water containing a little ammonia (3 pts. per 100) for two or three minutes, and then place in the above solution, drain and dry.

MALLMAN AND SCOLIK.

Preliminary Bath.

Water	200 c.c.
Ammonia	2 "

Soak the plate for two minutes.

Color Bath.

Erythrosine solution, 1:1000	25 c.c.
Ammonia	4 "
Water	175 "

The plate should not remain longer in this bath than one and a quarter minutes. A longer time reduces the general sensitiveness.

Alcohol .... 500 c.c.
Chinoline red .... 1 gram.

To which 50 c c. or a solution of

Alcohol .... 500 c. c.
Chinoline blue (cyanine) .... 1 gram.

The above solution is identical with the liquid dye sold under the name "Azaline."

BLUE PRINT FORMULAS.

No. 1.

Citrate of iron and ammonia .... $1\frac{7}{8}$ ounces.
Water .... 8 "

No. 2.

Ferricyanide of potassium .... $1\frac{1}{4}$ ounces.
Water .... 8 "

Mix equal parts of No. 1 and No. 2, and apply with brush or by floating for three minutes. Plain Rives paper should be used; hang up to dry in darkened room.

Black Lines upon a White Ground.

Water .... 9 ounces.
Gelatine .... 3 drams.
Perchloride of iron solution (U. S. Ph.) .... 6 "
Tartaric acid .... 3 "
Ferric sulphate .... 3 "

Filter off any precipitate that may be found and coat any good, stout white paper with the full strength solution. Expose in sunlight till details or lines are visible, and develop with

Gallic acid .... 6 drams.
Alcohol .... $6\frac{1}{2}$ ounces.
Water .... 32 "

Wash well in several changes of water.

COMBINED TONING AND FIXING BATHS.

Hyposulphite of soda .... 3 ounces.
Nitrate of lead .... 60 grains.
Chloride of gold .... 6 "
Water .... 24 ounces.

Gaedicke.

Hyposulphite of soda	200 grams.
Boric acid	30 "
Lead nitrate	15 "
Sulphocyanide of ammonium	20 "
Chloride of gold (1:200)	60 c.c.
Water	1,000 "

Chloride of gold	1 grain.
Phosphate of sodium	15 "
Sulphocyanide of ammonium	25 "
Hyposulphite of sodium	240 "
Water	2 ounces.

Dissolve the gold separately in a small quantity of water, and add it to the other solution.

No-gold Combined Bath.

Hypo	6 ounces.
Washing soda	$\frac{1}{4}$ "
Lead acetate	$\frac{1}{2}$ "
Water	1 quart.

Toning Formulæ.

Chloride of gold	1 grain.
Acetate of sodium	30 "
Water	8 ounces.

This must not be used till one day after preparation. It keeps well, and gives warm rich tones.

Chloride of gold	1 grain.
Bicarbonate of sodium	4 "
Water	8 ounces.

This is ready for immediate use after preparation, but it will not keep.

Chloride of gold	1 grain.
Phosphate of sodium	20 "
Water	8 ounces.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

Gold solution	10 drachms.
Acetate of lime	20 grains.
Chloride of lime	1 "
Tepid water	20 ounces.

The "gold solution" before mentioned is prepared by neutralizing as much as is required of a one-grain solution of chloride of gold by shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces tepid water, which will prove sufficient to tone a full-sized sheet of paper.

Chloride of gold	15 grains.
Water	5 ounces.

Neutralize with lime water, make up to fifteen ounces with water, and add two drams of chloride of calcium. This stock solution will keep for a long time. For use, dilute one ounce with ten ounces of water.

Mountant.

Best thin glue	3 ounces.
Golden syrup	$\frac{3}{4}$ "
Alcohol	3 "
Water	3 "

Soften the glue in 2 ounces of the water; heat gently in a pan of hot water, add the syrup (refined molasses), add the other ounce of water to the alcohol and pour into the jar under constant stirring.

For Coloring Photographs.

The finely powdered colors are mixed with the following:

Filtered albumen	100 c.c.
Ammonium carbonate	5 grams.
Glycerine	3 c.c.
Liquid ammonia	4 c.c.
Water	25 c.c.

Black for Woodwork.

Shellac	40 parts.
Borax	20 "
Glycerine	20 "
Water	500 "

After dissolving, add 50 parts aniline black.

For Writing on Glass.

Bleached shellac..,	2 parts.
Venice turpentine	1 "
Oil of turpentine	3 "
Lampblack	1 "

Warm the first three ingredients together over a water bath, and then stir in the lampblack, incorporating thoroughly.

Flash-Powders.

Powdered aluminium	21.7 parts by weight.
Antimony sulphide	13.8 " " "
Chlorate of potash	64.5 " " "

Powder separately and mix in a paper bag. Burns in one-seventeenth of a second.

Powdered aluminium	30 parts by weight.
Chlorate of potash	70 " " "

Burns in one-fifth of a second.

Le Roy's flash powder for orthochromatic work.

Magnesium powder	1 part.
Binoxide of barium	5 parts.

Retouching Varnish.

Sandarac	1 ounce.
Castor oil	80 grains.
Alcohol	6 ounces.

First dissolve the sandarac in the alcohol, and then add the oil.

Ground-Glass Varnish.

Sandarac	90 grains.
Mastic	20 "
Ether	2 ounces.
Benzole	½ to 1½ ounce

The proportion of the benzole added determines the nature of the matt obtained.

A Substitute for Varnishing.

JENNEY.

Alum	2 ounces.
Tannic acid	1 dram.
Water	16 ounces.

Immerse for from three to five minutes; too long an immersion loosens the glass from the film; wash for fifteen minutes. The film so treated is almost water-proof.

Photographic Societies.

UNITED STATES.

Akron Camera Club—Formerly Buchtel College Camera Club.—Meetings at the residences of members on the second Tuesday of each month. *President*, Prof. C. M. Knight; *Vice-President*, Ed. Terrass. *Treasurer*, Frank Adams; *Secretary*, Prof. W. D. Shipman.

Albany Camera Club.—Established 1887. Headquarters, 29 Steuben Street. Annual meeting, April. Meetings, first Friday in each month. *President*, Jno. S. Paterson; *Vice-President*, Dayton Ball; *Treasurer*, Dr. C. E. Davis; *Secretary*, E. J. Wheeler; *Librarian*, Chas. L. Palmer; *Directors*, W. W. Byington, Dr. S. B. Ward, Prof. M. Perkins, J. S. Van Buren, Karl J. Phisterer, C. B. Tillinghast, Chas. S. Pease, Aug. Pruyn.

Amateur Photographic Association.—Established 1887. Headquarters. Harrison's Studio, Selma, Ala. Annual meeting, first Thursday in January. Meetings, first Thursday in each month. *President*, Wm. S. Monk; *Secretary* and *Treasurer*, S. Orlando Trippe, Selma, Ala.

American Institute, N. Y. (Photographical Section).—Established 1859. Headquarters, Institute Rooms, 111–115 West 38th Street. Annual meeting, February. Meetings, first Tuesday in each month, excepting July and August, *President*, Henry J. Newton; *Vice-President*, Cornelius Van Brunt; *Treasurer*, Edward Schell; *Secretary*, Oscar G. Mason, Photographical Department, Bellevue Hospital, New York City.

American Lantern Slide Interchange.—Established 1885. Reorganized 1888. Headquarters, 361 Broadway, New York, N. Y. Annual meeting, November. *Manager*, F. C. Beach; *Assistant Manager*, W. H. Rau; *Secretary* and *Treasurer*, Will H. Olmstead, Syracuse, N. Y.

American League of Amateur Photographers.—Organized July 12, 1892. Incorporated Sept. 22, 1893. *President*, Oscar S. Teale, Plainfield, N. J.; *First Vice-President*, A. J. Thomas, Hoboken, N. J.; *Second Vice-President*, R. A. Wadsworth, Hartford, Conn.; *Secretary*, R. M. Fuller, Cranford, N. J.; *Treasurer*, W. H. Drew, Lynn, Mass.; *Delegate-at-Large*, J. T. Wilcox, Box 44, Cranford, N. J.

Amherst College Camera Club.—Established 1890. Headquarters, North College, Amherst, Mass.

Atlanta Camera Club.—Established 1888. Out of existence.

Baltimore Photographic Club.—Established 1891. *President*, A. S. Murray; *Vice-President*, Dr. Frank Slothower; *Treasurer*, E. M. Barker; *Secretary*, C. E. Needles.

Boston Camera Club.—Established 1881. Headquarters, 50 Bromfield Street, Boston, Mass. Annual meeting, January. Meetings, first Monday in every month, except July, August and September. *President*, Edward R.

Andrews; *Vice-Presidents*, Geo. M. Morgan, Wm. S. Briggs, J. Prince Loud; *Treasurer*, Owen A. Eames; *Secretary*, Wilbur C. Brown, Naval Office, Custom House, Boston, Mass.; *Librarian*, Chas. Sprague; *Executive Committee* includes above officers and following: Chas. H. Currier, Jos. T. Greene, David W. Lewis, John C. Holman, Francis H. Manning, Ernest O. Cockayne.

Bridgeton Camera Society.—Established 1890. Headquarters, 48 East Commerce Street. *President*, Henry A. Janvier; *Vice-President*, George Hampton; *Treasurer*, Sydney E. Bowen; *Recording Secretary*, Oscar F. Anderson; *Corresponding Secretary*, W. Read Elmer; *Committee*, Hugh L. Reeves, Howard W. Fithian and Sydney E. Bowen.

Brooklyn Academy of Photography.—Incorporated 1887. Headquarters, 177 and 179 Montague Street. Annual meeting, February. Meetings, second Wednesday of each month. *President*, John Merritt, M.D.; *Vice-Presidents*, F. Dana Reed, Starks W. Lewis; *Treasurer*, Wm. T. Wintringham; *Recording Secretary*, August A. Goubert; *Corresponding Secretary*, Harry S. Fowler, 578 Halsey Street, Brooklyn, N. Y.; *Curator* and *Librarian*, W. M. Arnold.

Brooklyn Academy of Science.—Established 1888. *Secretary*, J. W. Holbrook, Jr., 462 Hart Street, Brooklyn, N. Y.

Brooklyn Camera Club.—Established 1888. Out of existence.

Brooklyn Institute, Department of Photography.—Established March, 1889. Headquarters, 201 Montague Street. Annual meeting, May. *President*, W. H. Cooper; *Vice-President*, Mrs. C. H. Burdett; *Curator*, Dr. L. E. Meeker; *Secretary*, Gould W. Hart.

Buffalo Camera Club.—Established 1888. Headquarters, Club rooms, Market Arcade, Main Street. Annual meeting, second Tuesday in October. Meetings, second Tuesday in each month. *President*, Willis O. Chapin; *Vice-President*, Dr. G. Hunter Bartlett; *Treasurer*, Geo. J. Bailey; *Secretary*, Chas. R. Wilson, 261 George Street, Buffalo, N. Y; *Board of Directors* consists of above officers and following: Harlow H. Boyce, F. A. Fell, A. W. Simon, Michael J. Stark, M. D. Mann.

California Camera Club.—Incorporated 1890. Headquarters, Academy of Science Building, 819 Market Street. Annual meeting, April. Meetings, first Tuesday in each month. *President*, Chas. A. Adams; *1st Vice-President*, H. C. Tibbitts; *2d Vice-President*, W. J. Street; *Treasurer*, Geo. W. Reed; *Secretary*, C. F. Cormack; *Corresponding Secretary*, C. S. Close, 209 Powell Street, San Francisco, Cal.; *Librarian*, H. C. Owens. *Board of Directors* consists of above officers and W. B. Webster, W. E. Goodrum, T. H. Jones, F. W. Fuller. Club rooms always open to members of other photographic clubs.

Camera Club of Hartford.—Established 1885. Incorporated 1892. Headquarters, 25 Pratt Street. Meetings, second Tuesday of each month. *President*, H. O. Warner; *Treasurer*, F. A. Thompson; *Secretary*, L. S. Hickmott, P. O. Box 480, Hartford, Conn.; *Corresponding Secretary*, R. A. Wadsworth, P. O. Box 1004.

Camera Club of the Capitol Bicycle Club.—Established 1893. Club House, 409 Fifteenth Street, Washington, D. C. *President*, H. G. Douglas; *Treasurer* and *Secretary*, A. J. Henry. Meetings, first and third Thursdays in each month. Holds one lantern slide exhibition and one exhibition of prints annually.

"CAMERADS."—Established 1888. Headquarters, Chemical Lecture Rooms, Rutgers College, New Brunswick, N. J. Annual meeting, April. Meetings, first Wednesday in each month. *President*, Peter T. Austin, Ph.D.; *Vice-President*, Wm. D. Horn; *Treasurer*, Chas. V. Myers; *Secretary*, Dr. Harvey Iredell, Lock Box 34, New Brunswick, N. J.

CAPITAL CAMERA CLUB.—Established 1891. Annual meeting, May. Headquarters, 401 Seventh Street, N. W., Washington, D. C. Meetings every first and third Saturday in each month. *President*, José M. Yznaga; *Vice-President* Eugene Lee Ferguson; *Treasurer*, Chas. L. Du Bois; *Secretary*, Frank B. Dantee, 1305 T. Street, N. W., Washington, D. C.

CENTRAL CAMERA CLUB, BROOKLYN, Y. M. C. A.—Established 1888. Headquarters, "Studio," 502 Fulton Street. Annual meeting, January. Meetings, first and third Thursdays in each month. *President*, Wm. H. Lowery; *Vice-President*, A. C. Ruprecht; *Treasurer*, E. A. Crowell; *Secretary*, B. A. Burger, 160-162 Atlantic Avenue, Brooklyn, N. Y.

CHAUTAUQUA PHOTOGRAPHIC EXCHANGE CLUB.—Organized 1888. Annual meeting, Chautauqua Assembly Grounds, Chautauqua, N. Y. Last year's officers are: *President*, Hy. E. Canfield; *Secretary and Treasurer*, Mrs. C. L. Pierce, "Elmhurst," Riverside, Conn.; *Assistant Secretary*, Gould W. Hart.

CHICAGO CAMERA CLUB.—Established 1889. Annual meeting, April. *President*, Rev. M. L. Williston; *Vice-President*, Dr. M. R. Brown; *Treasurer*, E. J. Fowler; *Secretary*, W. W. Abbott.

CHICAGO LANTERN SLIDE CLUB.—Established 1886. Headquarters, 4 East Monroe Street. Annual meeting, January. Meetings, second and fourth Wednesdays in each month. *President*, T. W. Sheardown; *Treasurer*, Marshall Waite; *Secretary*, W. A. Morse, 20 Kemper Place, Chicago, Ill.

CINCINNATI SOCIETY OF NATURAL HISTORY (Photographic Section).—Established 1884. Annual meeting, April. *President*, H. J. Buntin; *Vice-President*, F. H. Kelley ; *Treasurer*, F. M. Coppock : *Librarian*, Dr. A. J. Carson ; *Recording Secretary*, John M. Kay, 108 West 4th Street ; *Corresponding Secretary*, W. A. McCord.

CLEVELAND CAMERA CLUB.—Organized, January 25th, 1887. Headquarters, 5 Euclid Avenue, Cleveland, Ohio. *President*, Prof. John Bolton; *Vice-President*, Frank Dorn; *Treasurer*, W. F. Dorn ; *Secretary*, R. Dayton, M.D., 1202 Willson Avenue, Cleveland, O.

CLINTON CAMERA CLUB.—*President*, H. A. Thissell; *Vice-President*, Dr. W. O. Johnson; *Secretary* and *Treasurer*, David Dias.

COLORADO CAMERA CLUB.—Established 1891. Headquarters, Williamson Block, Denver, Colorado. Annual meeting, December. *President*, W.H. Jackson; *Vice-President*, W. A. Hover; *Treasurer*, H. D. Smith; *Secretary*, Ethelbert L. Kern, Box 533, Denver, Col.; *Corresponding Secretary*, H. D. Smith.

COLUMBIA COLLEGE AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1893. Headquarters, Columbia College. Annual meeting, May. *President*, Henry R. Taylor ; *Vice-President*, George W. Giddings; *Treasurer*, Dwight Taylor; *Secretary*, H. M. Brookfield.

COLUMBIA PHOTOGRAPHIC SOCIETY.—Headquarters, 1507 Columbia Avenue, Philadelphia. *President*, Dr. G. J. R. Miller; *Vice-President*, Jos. S. Powell; *Treasurer* and *Secretary*, Nat. Pollak; *House Committee*, Chas. H. Smith, B. L. Berry and J. C. Leek.

Columbus Camera Club.—Established 1884. Headquarters, Y. M. C. A. Building. Annual meeting, December. Meetings, third Thursday in each month. *President*, John Field; *Vice-President*, C. H. Doty; *Treasurer*, C. S. Bradley; *Secretary*, J. J. Jennings.

Cranford Camera Club.—Established 1888. Disbanded 1894.

Daguerre Camera Club.—Established 1889. *President*, Frank D. Blish; *Secretary* and *Treasurer*, Wells B. Sizer, Harbert, Mich.

Delaware Camera Club.—Established 1892. Headquarters, Equitable Building, Wilmington, Delaware. Meetings, first Thursday in each month. *President*, John M. Rogers; *Vice-Presidents*, Miss Rachel, C. Howland, Richard P. Pinn; *Treasurer*, Caleb M. Sherward; *Secretary*, Willard C. Jackson.

Detroit Lantern Club.—Established 1891. Headquarters, Detroit Museum of Art. Annual meeting, January. Meetings, second Monday in each month. *President*, Frank E. Kirby; *Secretary* and *Treasurer*, D. Farrand Henry, 52 Woodward Avenue, Detroit, Mich.; *Director*, C. C. Hinchman.

Detroit Photographic Society.—Not formally dissolved, but practically out of existence.

Dixon Camera Club (Dixon, Illinois).—Annual meeting April. *President*, E. E. Shaw; *Vice-President*, A. A. Phelps; *Treasurer*, H. A. Brown; *Secretary*, G. H. T. Shaw.

Elizabeth Photo-Art Club.—Established 1893. Headquarters, 96 Broad Street, Elizabeth, N. J. Annual meeting, first Tuesday in May. Meetings, first and third Tuesdays of each month. *President*, D. R. Blackford; *Vice-President*, E. M. Estabrook; *Treasurer*, Jas. A. Woodward; *Secretary*, N. C. Darby, 315 No. Broad Street, Elizabeth, N. J.

German Photographic Society of New York.—Established 1868. Headquarters, 62 East Fourth Street. Meetings, second and fourth Wednesday in each month. *President*, A. Middleberger; *Vice-President*, Otto Buehler; *Secretary*, H. G. Borgfeldt, 850 Broadway, Brooklyn; *Treasurer*, G. E. Pellnitz.

Hamilton Association Camera Club.—Established 1892. Headquarters, Museum, Main Street, West. Annual meeting, April. Meetings, last Tuesday of each month. *Hon. Chairman*, A. Alexander; *Chairman*, R. J. Moodie; *First Vice-Chairman*, Jno. Eastwood; *Second Vice-Chairman*, W. J. Grant; *Secretary* and *Treasurer*, Wm. White, 9 James Street, North, Hamilton, Ont., Canada.

Harvard Camera Club.—Established 1889. Headquarters, Harvard University, Cambridge, Mass. Annual meeting, June. Meetings monthly. *President*, P. P. Sharples; *Vice-President*, H. Emerson; *Secretary* and *Treasurer*, J. G. M. Glessner, 8 Hastings Hall, Cambridge, Mass.

Hiawatha Camera Club of Minneapolis. "Disbanded some time ago," A. L. Eidermiller.

Hoboken Camera Club.—Established 1889. Headquarters, 1036 Park

Avenue, Hoboken, N. J. Annual meeting, March. Meetings, first Tuesday in each month. *President*, A. J. Thomas ; *Vice-President*, C. Sudhaus ; *Treasurer*, H. J. Kaltenbach ; *Secretary*, A. L. Smith, 1045 Bloomfield Street, Hoboken. N. J.; *Board of Trustees*, A. Beyer, F. M. Child, Paul Junck.

INDIANAPOLIS CAMERA CLUB.—Practically out of existence.

INTERNATIONAL PHOTO PRINT EXCHANGE.—Established 1893. *General Secretary*, Walter Sprange, Beach Bluff, Mass.

IRVINGTON (N. J.) ART AND CAMERA CLUB.—Established 1892. Headquarters, Irvington, N. J. Annual meeting, first Friday in April. Meetings, Fridays. *President*, Edwin D. Harrison; *Vice-President*, F. H. Morrell; *Treasurer*, James Peckwell, Jr.; *Secretary*, Melton Tompkins; *Financial Secretary*, Isaac J. Casey.

JAMESTOWN CAMERA CLUB.—Disbanded.

JOLIET LANTERN SLIDE CLUB.—" Has disbanded," A. H. Wagner.

LAWRENCE (Mass.) CAMERA CLUB.—Established 1893. Headquarters, Brechin Block. Annual meeting, first Wednesday in April. Meetings, first Wednesday in each month, except July and August. *President*, John H. Green; *Vice-Presidents*, F. E. Batcheller, G. C. Cannon; *Treasurer*, A. E. Butler; *Secretary*, R. A. Hale, Lawrence, Mass. *Directors*, F. A. Carr, Miss Mabel F. Noyes, Miss Florence Howard.

LOWELL (Mass.) CAMERA CLUB.—Established 1889. Incorporated 1892. Headquarters, Runels Building. Annual meeting, March. Meetings called by President. *President*, Paul Butler; *Vice-Presidents*, W. P. Atwood, W. E. Badger; *Treasurer*, M. A. Taylor; *Secretary*, Geo. A. Nelson, 91 Mansur Street, Lowell, Mass. *Librarian*, Fay H. Martin; *Directors*, F. T. Walsh, Chas. Runels, Jno. I. Coggeshall.

LYNN CAMERA CLUB.—Established 1888. Headquarters, 42 Broad Street. Annual meeting, January. Meetings first Tuesday in each month. Club defunct. No formal disorganization, Last list of officers as follows: *President*, Wm. H. Drew; *Treasurer*, E. F. Bacheller; *Secretary*, C. A. Lawrence, 42 Broad Street, Lynn, Mass.

MANHATTAN CHAPTER, AGASSIZ ASSOCIATION.—Established 1881. Annual meeting, January 12th. Meetings, Friday after first Monday in each month. *President*, C. F. Groth; *Vice-President*, C. Kromm; *Treasurer*, W. S. Miller; *Secretary*, E. B. Miller, 141 East 40th Street, New York, N. Y.; *Curator and Librarian*, C. J. Miller; *Associate Trustees*, H. T. Rowley, F. Kromm, E. Staubsandt, A. Breunich, Jr., W. T. Demarest.

MARLBORO CAMERA CLUB.—Disbanded.

MATTAPAN CAMERA CLUB.—Established 1890. Headquarters, Secretary's studio, Brush Hill Road. Annual meeting, May. Meetings, at residences of members; place and time given by notice. *President*, Jno. A. Locklin; *Treasurer*, Alfred L. Karcher; *Librarian and Secretary*, Erdmann Sonnenbrodt; *Lecturer*, H. N. Locklin.

MEMPHIS CAMERA CLUB.—Established 1893. Headquarters, Rooms 126, 128 Randolph Building. Annual meeting, April. Meetings, first Tuesday in each month. *President*, Sam. J. Latta; *Vice-President*, J. B. Heiskell; *Secretary* and *Treasurer*, Geo. O. Friedel, 370 Second Street, Memphis, Tenn.

Middletown Camera Club.—Established 1891. Practically out of existence. Was organized as a section of the Middletown Scientific Association.

Milwaukee Camera Club.—Established 1889. Disbanded.

Minneapolis Camera Club.—Incorporated 1892. Headquarters, American Terrace, 13–15 Fourth Street, North. Annual meeting, April. Meetings, second Wednesday in each month. *President*, W. Channing Whitney; *Vice-President*, A. L. Eidemiller; *Treasurer*, Chas. S. Fellows; *Secretary*, C. J. Hibbard, 10 South Fourth Street; *Board of Directors* includes above officers and following members, H. E. Murdock, W. M. Tenney, W. B. Angir, G. W. Beach, C. A. McCollom, M.D., A. L. Broughton.

Montreal Camera Club.—Established 1890. Incorporated 1892. Headquarters, Y. M. C. A. Building, Dominion Square. Annual meeting, May. Meetings, first Monday in each month. *President*, Prof. D. P. Penhallow, F.R.C.S., F.R.M.S.; *Vice-President*, E. Stanger; *Hon. Secretary* and *Treasurer*, A. W. Cole, 28 Victoria Street, Montreal, Que., Can.

Mystic Camera Club.—Established June 14, 1889. Incorporated March 17, 1891. Headquarters, 28 Main Street, Medford, Mass. Annual meeting, first Tuesday in January. *President*, B. D. B. Bourne; *Vice-President*, Will C. Eddy; *Treasurer*, Jos. B. Thaxter, Jr.; *Secretary*, Chas. D. Tucker, 6 Pleasant Place, Medford, Mass.

Newark (Del.) Camera Club.—Established April, 1892. Headquarters, Newark, Delaware. Annual meeting, May. Meetings, second Monday of each month. See below.

Newark Camera Club.—Established 1888. Headquarters, 828 Broad Street. Annual meeting, April. Meetings, second and fourth Monday evenings in each month. *President*, J. M. Foote; *Vice-President*, Wm. Archibald; *Treasurer*, Harry W. Smith; *Secretary*, D. S. Plumb, 24 Boudinot Street, Newark, N. J.; *Director Lantern Slide Interchange*, Harry W. Smith.

Newark (Del.) Camera Club.—Established 1892. Headquarters, Newark, Delaware. Annual meeting, May. Meetings, monthly. *President*, Prof. F. D. Chester; *Vice-President*, F. W. Curtis; *Secretary* and *Treasurer*, Prof. W. H. Bishop.

Newark Y. M. C. A. Camera Club.—Not yet reorganized.

New Britain Camera Club.—Established 1892. Headquarters, 210 Main Street. Annual meeting, January. Meetings, second and fourth Tuesdays in each month. *President*, E. M. Hulbert; *Vice-President*, R. S. Brown; *Secretary* and *Treasurer*, F. B. Wood, 273 Main Street, New Britain, Conn. *Board of Control*, Jas. Shepard, C. F. Chase, R. H. Russell, A. F. Norton.

New England Lantern Slide Exchange.—Membership limited to fifteen photographic societies, which furnish every year fifty slides each. Address *Secretary*, Providence Camera Club.

New Orleans Camera Club.—Established 1886. Headquarters, 12 Union Street. Annual meeting, November. Meetings, every Wednesday. Business meetings, first Wednesday in each month. *President*, B. C. Shields; *Vice-President*, S. L. Mitchel; *Treasurer*, H. C. Delery; *Secretary*, R. S. Charles, Jr., care Illinois Central Railroad Company, New Orleans, La.

NEWTON CAMERA CLUB.—Established 1893. Headquarters, Club House, Brookside Avenue. *President*, Dr. E. B. Hitchcock; *Vice-President*, J. W. Barber; *Treasurer* and *Secretary*, Chas. H. Fewkes: *Board of Directors*, Dr. E. B. Hitchcock, J. W. Barber, Chas. H. Fewkes, Wm. Bacon, F. E. Stanley.

NEW YORK CAMERA CLUB.—Established 1888. Headquarters, 314 Fifth Avenue. *President*, William J. Cassard; *Vice-President*, William Bunker; *Treasurer*, Robert J. Devlin, M.D.; *Secretary*, Harry B. Reid; *Librarian*, Chas. W. Stevens, M.D.; *Board of Trustees*, Wm. J. Cassard, Wm. Bunker, R. T. H. Halsey, Jos. T. Low, John V. Van Woert, Robt. J. Devlin, M.D., Lindsay C. Ivory, Harry B. Reid, David Williams.

OLD COLONY CAMERA CLUB.—Established 1890. Headquarters, Smith Building, Liberty Street, Rockland, Mass. Annual meeting, first Saturday in January. Meetings, every alternate Tuesday evening. *President*, David Smith; *Vice-President* and *Treasurer*, Emery H. Jenkins; *Secretary*, Silas Gurney, Box 546, Rockland, Mass.

OMAHA CAMERA CLUB.—Established Feb. 13, 1894. *President*, Dr. C. W. Hayes; *Vice-Presidents*, George Patterson, M. A. Hall; *Treasurer*, T. H. Johnson; *Secretary*, W. F. Durnall.

ONEIDA CAMERA CLUB.—Established February, 1894. *President*, F. B. Cheney; *Vice-President*, H. K. Noyes; *Treasurer*, Albert Dygett; *Secretary*, E. B. Noble, Oneida, N. Y.

ORANGE (N. J.) CAMERA CLUB.—Established 1892. Headquarters, 222 Main Street. Annual meeting, March. Meetings, 5th and 20th of every month, except July and August. *President*, W. H. Cheney; *Vice-President*, J. L. Seward, M.D.; *Treasurer*, W. T. Baird; *Secretary*, H. R. Terhune; *Librarian*, Wm. P. Thorp; *Chairman Lantern Slide Committee*, J. L. Yatman.

PATERSON CAMERA CLUB.—Established 1893. Headquarters, Y. C. M. A. Building, Ellison, Street. Annual meeting, May. Meetings, first Monday in each month. *President*, C. M. Giles, 382 Ellison Street; *Vice-President*, H. W. Gledhill; *Treasurer*, Wm. W. Moore; *Recording Secretary*, Wm. Ginder; *Corresponding Secretary*, Chas. D. Cooke, Cooke Locomotive Works, Paterson, N. J.

PEABODY CAMERA CLUB.—Salem, Mass. Disbanded.

PHŒNIX CAMERA CLUB.—Established 1892. Annual meeting, November. *President*, H. F. Robinson; *Vice-President*, Mrs. J. Millay; *Treasurer* and *Secretary*, Thomas Armstrong, Jr., Phœnix, Ariz.

PHOTOGRAPHERS' AND ARTISTS' MUTUAL BENEFIT ASSOCIATION.—Out of existence.

PHOTOGRAPHERS' ASSOCIATION OF AMERICA.—Meeting, 1895, Detroit, Mich. *President*, J. S. Schneider; *First Vice-President*, R. P. Bellsmith; *Second Vice-President*, Geo. Steckel; *Treasurer*, J. Ed. Rösch; *Secretary*, Pirie MacDonald, Albany, N. Y; one local secretary.

PHOTOGRAPHERS' ASSOCIATION OF BROOKLYN.—Established 1888. "Out of existence."—E. F. Wagner.

PHOTOGRAPHIC ASSOCIATION OF CANADA.—Established 1883. Headquarters, Toronto, Ont., Canada. Annual meeting, November. *President*, A. M. Cunningham; *First Vice-President*, F. Cooper; *Second Vice-President*, J. F. Bryce;

Third Vice-President, W. F. Johnson; *Secretary* and *Treasurer*, E. Poole, St. Catharine's, Ont., Canada.

Photographers' Association of Iowa.—Meetings held annually at the Robert Dempster Company's Photo Stock Rooms, Des Moines, Iowa. *President*, F. W. Medlar; *First Vice-President*, W. O. Reed; *Second Vice-President*, J. R. Hall; *Treasurer*, T. A. Brown; *Secretary*, F. W. Webster, 411 Walnut Street, Des Moines, Iowa.

Photographers' Association of Nebraska.—*President*, J. Leschinsky, of Grand Island; *Vice-Presidents*, T. W. Tollman, of Nebraska City, and J. V. Sturdevant; *Treasurer*, A. Smith, of Crete; *Secretary*, W. P. Fritz, of Fremont. The 1895 meeting will be held at Lincoln, Nebraska.

Photographic Society of Kansas City.—Established 1891. Headquarters, 1431 Walnut Street. Meetings, second and fourth Wednesdays in each month. *President*, J. P. Reymond; *Vice-President*, Dr. W. T. Stark; *Treasurer*, Carl K. Brown; *Secretary*, C. H. Clarke, 613 Delaware Street, Kansas City, Mo.; *Executive Committee*, J. P. Reymond, C. H. Clarke, Dr. W. T. Stark.

Photographers' Association of Missouri.—*President*, W. E. Nottingham; *First Vice-President*, W. L. Nichols; *Second Vice-President*, B. F. Mathis; *Treasurer*, M. Patterson; *Secretary*, Edwin Thomas, Bevier, Mo.

Photographers' Association of Ohio.—Office of Executive Committee, Hamilton, Ohio. *President*, A. L. Bowersox; *First Vice-President*, John Pfeifer; *Second Vice-President*, Mr. Van Loo; *Treasurer*, Mr. Brenner; *Secretary*, Geo. H. Barnum, Springfield, Ohio.

Photographic Society of Philadelphia.—Established 1862. Headquarters, 10 South 18th Street. Annual meeting, April. Meetings, second and fourth Wednesdays in every month. *President*, Joseph H. Burroughs; *Vice-Presidents*, Chas. R. Pancoast, Robt. S. Redfield; *Treasurer*, Geo. Vaux, Jr.; *Secretary*, Edmund Stirling, care of *Public Ledger*, Philadelphia, Pa.; *Board of Directors* includes above officers and following members: Jno. C. Browne, Jno. G. Bullock, Jno. Carbutt, Sam'l Castner, Jr., J. H. Ewing, Alex. Hemsley, F. E. Ives, Wm. N. Jennings, A. B. Parvin, Wm. H. Rau, A. W. Robinson, Sam'l Sartain.

Photographic Society of Waterbury (Conn.).—Established 1888. Headquarters, Brown's Block, South Main Street. Annual meeting, April. Meetings, first and third Tuesdays in each month. *President*, H. W. Hayden; *Vice-President*, Leroy S. White; *Treasurer*, E. W. Mooring, Jr.; *Secretary*, H. A. Hoadley, Box 442, Waterbury, Conn.; *Executive Committee*, H. G. Filley, H. T. Stedman, Geo. Bario, C. H. Rockwood, Frank Welton.

Pittsburg Amateur Photographers' Society.—Organized 1886. Headquarters, Academy of Science and Art, Pittsburg, Pa. *President*, W. S. Bell; *Vice-President*, W. S. Clow; *Treasurer*, W. J. Hunker; *Secretary*, Jos. H. Hunker, 248 Centre Avenue, Pittsburg, Pa.

Pittsburg Amateur Photographers' Association.—Established 1894. *President*, E. M. Katz; *Vice-President*, J. E. Hathaway; *Treasurer and Secretary*, Ross Wilson.

Pittsfield Camera Club.—Established 1892. Headquarters, Pittsfield, Mass. Annual meeting, February. Meetings, second Wednesday in each month. *President*, A. N. French ; *Vice-President*, J. F. Middleton ; *Treasurer*, Allen H. Bagg ; *Secretary*, W. D. Goodwin, 120 Elizabeth Street, Pittsfield, Mass.

Plainfield Camera Club.—Established 1888. Headquarters, Babcock Building, West Front Street. *President*, Oscar Teale; *Vice-President*, John E. Stewart; *Treasurer*, Harold Serrell; *Secretary*, Harry H. Coward.

Portland Camera Club.—Established 1890. Headquarters, Society of Art Building, Deering Place, Portland, Me. Annual meeting, first Tuesday in February. Meetings, first Tuesday in each month, except July and August. *President*, Dr. S. P. Warren ; *Vice-President*, Nathan Clifford ; *Treasurer*, C. T. Whipple ; *Secretary*, Frederick Fox, Jr.; *Executive Committee*, F. M. Lawrence, Harry Levy, F. H. Little, Wm. Sweat ; *Lantern Slide Director*, W. C. King.

Postal Photographic Club.—Established 1888. *President*, Prof. Randall Spaulding ; *Secretary* and *Treasurer*, F. E. Fairbanks, Fitchburg, Mass.

Professional Photographers' Association of Hartford.—Disbanded.

Providence Camera Club.—Established 1883. Headquarters, 87 Weybosset Street. Annual meeting, June. Meetings first Tuesday in each month. *President*, R. Clinton Fuller ; *Vice-President*, Joseph A. Miller, Jr. ; *Treasurer*, E. A. Darling ; *Recording Secretary*, Samuel B. Burnham ; *Corresponding Secretary*, J. Eliot Davison, Pawtucket, R. I.

Putnam (Conn.) Camera Club.—Established 1888. Headquarters, Putnam, Conn. Annual meeting, June. Meetings, first Friday in each month. *President*, Geo. E. Dresser ; *Treasurer*, Ed. F. Whitmore ; *Secretary*, Erie H. Johnson, Putnam, Conn.

Quebec (Canada) Camera Club.—Established 1887. Headquarters, Capt. Imlah's Quarters, Citadel, Quebec, Canada. Annual meeting, second Monday in December. *President*, Major James Peters ; *Vice-President*, Capt. J. George Garneau ; *Treasurer*, James Brodie ; *Secretary*, Capt. Ernest F. Würtele, Box 1117, Quebec, Canada ; *Committee*, Capt. W. E. Imlah, J. B. Amyot.

Rahway Camera Club.—*President*, Wm. Chamberlain; *Vice-President*, W. P. Easterbrook; *Secretary*, B. C. Mead.

Richmond Camera Club.—Established 1890. "The club exists in name only," C. D. Halliston.

San Diego (Cal.) Camera Club.—Established 1892. Headquarters, D street, between Fourth and Fifth streets. *President*, Dr. Joseph Rhodes; *Vice-President*, Chas. Wellborn; *Treasurer*, Laura B. Anderson; *Librarian*, Fred Creelman; *Secretary*, W. W. Whitson.

St. Louis Camera Club.—Established 1885. Incorporated 1889. Headquarters, Pastime Club House, 911 North Vandeventer Avenue. Annual meeting, April. Meetings, first and third Tuesdays in each month. *President*, Jno. B. Holman; *Vice-President*, Milton T. Corwin; *Secretary* and *Treasurer*, H. B. Alexander, St. Louis National Bank, St. Louis, Mo.; *Asst. Secretary* and *Treasurer*, J. F. Hickman; *Chairman of Lantern Slide Committee*, Geo. H. Kilker; *Chairman of House Committee*, W. H. Wilcox; *Chairman of Membership Committee*, Aug. H. Kirchner.

St. Paul Camera Club.—Established 1893. Headquarters, 14 East Third

Street. Annual meeting, March. Meetings second Tuesday in each month. *President*, James Paris; *Vice-President*, D. F. Brown; *Treasurer*, W. B. Thorne; *Secretary*, W. J. Sonnen; *Directors* include above officers and following: W. A. Russell, E. F. Zimmerman, C. H. Buckley, Lorn Campbell, J. C. Jensen, A. M. P. Cowley.

SCHUYLKILL CAMERA CLUB.—Established 1889. Headquarters 500 Mauch Chunk Street, Pottsville, Pa. Annual meeting, February or March. Meetings last Friday in each month. *President*, A. W. Sheafer; *Vice-President*, Miss E. Roads; *Treasurer*, W. L. Sheafer; *Asst. Secretary*, R. Y. Patterson; *Secretary*, B. S. Simonds, "The Orchard," Pottsville, Pa.

SILVER STATE CAMERA CLUB.—Established 1890. Disbanded.

SOCIETY OF AMATEUR PHOTOGRAPHERS OF NEW YORK.—Established 1884. Headquarters, 113 West 38th Street. Annual meeting, April. Meetings, second Tuesday in each month, excepting July and August. *President*, R. A. B. Dayton; *Vice-President*, F. C. Elgar; *Treasurer*, C. C. Roumage; *Recording Secretary*, A. P. Schoen; *Corresponding Secretary*, T. J. Burton, 113 West 38th Street, New York, N. Y.; *Directors*, R. L. Bracklow, E. T. Birdsall, L. T. Brush, A. E. Helmrich, H. S. Mack, Dr. J. T. Nagle, Dr. F. D. Skeel, A. Stetson.

SPRINGFIELD (Mass.) CAMERA CLUB.—Established 1886. Headquarters, 465 Main Street. *President*, Henry C. Haile; *Treasurer*, Wm. M. Lester; *Secretary*, Chas. C. McElwain, P. O. Box 1528, Springfield, Mass.; *Librarian*, L. C. Bolan. The above officers, with Wm. R. Draper, constitute the executive committee.

STEVENS' PHOTOGRAPHIC SOCIETY.—Established 1889. Headquarters, Stevens' Institute of Technology. Annual meeting, October. Meetings, first week in each month. *President*, Robert E. Hall; *Vice-President*, Joseph Cottier; *Treasurer*, H. S. L. Verley; *Secretary*, H. H. Maxfield, Stevens' Institute of Technology, Hoboken, N. J.

SYRACUSE CAMERA CLUB.—Established 1886. Headquarters, 6 Butter Block. Meetings, Fridays. Annual meeting, June. *President*, Gaylord P. Clark; *Vice-President*, Geo. Timmins; *Treasurer*, E. G. Wyckoff; *Secretary*, E. C. Howe, 11 South Salina Street, Syracuse, N. Y.; *Lantern Slide Director*, W. H. Olmstead.

"TECH" CAMERA CLUB.—Established 1890. Headquarters, Boynton Hall, W. P. I., Worcester, Mass. Annual meeting, June. Meetings, first and third Saturdays in each month. *President*, Ed. H. Keith; *Vice-President*. Henry N. Smith; *Treasurer*, Edward W. Vaill; *Secretary*, Henry J. Fuller.

TECHNOLOGY PHOTOGRAPHIC SOCIETY.—Founded 1886. Headquarters, Massachusetts Institute of Technology, Boylston Street, Boston, Mass. Meetings, second Tuesday of each month during sessions of the Institute. *President*, E. Johnson Loring; *Vice-President*, A. Sperry; *Treasurer*, H. R. Barton; *Secretary*, W. H. Sayward, Jr., Box 93, Massachusetts Institute of Technology, Back Bay, Boston, Mass.

TORONTO CAMERA CLUB.—Established 1887. Incorporated 1893. Headquarters, second floor, corner Yonge and Gerrard Streets. Annual meeting, first Monday in November; *Hon. President*, Prof. W. H. Ellis, M.D.; *President*, Arthur W. Croil; *Vice-Presidents*, W. H. Moss, George H. Gooderham; *Secretary* and *Treasurer*, Ernest M. Lake.

UNION COUNTY CAMERA CLUB.—Established 1889. Disbanded

WAGNER FREE INSTITUTE OF SCIENCE CAMERA CLUB.—Has disbanded for the present.

WATERTOWN CAMERA CLUB.—Headquarters, 212 Public Square, Watertown, N. Y. *President*, A. R. Wilson; *Treasurer*, Geo. Mowe; *Secretary*, C. A. Wilson, 2½ Public Square, Watertown, N. Y.

WOODSTOCK CAMERA CLUB.—Established 1892. Disbanded.

UNITED KINGDOM.

ABERDEENSHIRE AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1891. Headquarters, 26 Broad Street, Aberdeen. Meetings, fourth Tuesday in each month. *President*, W. Todd Moffatt; *Vice-Presidents*, J. Main, W. A. Hawes; *Treasurer*, A. B. Young; *Secretary*, G. Brodie; *Assistant Secretary*, J. Milne, 26 Broad Street, Aberdeen, Scotland.

ABNEY CAMERA CLUB.—Established 1889. *Secretary*, F. H. Leeds, 26 East Bank, Stamford Hill, London, N. England.

ACCRINGTON AND DISTRICT CAMERA CLUB.—Established 1891. Headquarters, Victoria restaurant. Meetings, first Monday in each month. *President*, Dr. Clayton; *Vice-Presidents*, J. Barnes, W. J. Cheney, Dr. Gedies, Rev. J. R. Rendell, T. Stanley; *Treasurer*, B. T. Westwell; *Secretary*, Isaac Harison, Rothwell Heights, Accrington, England.

AFFILIATION OF PHOTOGRAPHIC SOCIETIES.—Annual meeting, January. *Chairman*, Edgar Clifton; *Treasurer*, George Scamell; *Auditors*, J. W. Marchant and P. Everitt.

AINTREE AND DISTRICT (LIVERPOOL) SOCIETY OF PHOTOGRAPHERS AND LANTERNISTS).—Organized March, 1894. *President*, W. B. Hellon; *Council*, R. M. Owen, W. R. McKerlie, W. Lockier, J. A. Gee, G. H. Jackson, and J. Harris; *Treasurer*, D. Neill; *Secretary*, C. H. Adkins, 28 Orrell Lane, Aintree, England.

ALDENHAM INSTITUTE CAMERA CLUB.—Established 1889. Headquarters, Aldenham Institute, Pancras Road, London, N. W. Meetings, fortnightly. Annual meeting, October. *President*, W. V. Mingard; *Secretary*, E. Pringle, Aldenham Institute.

AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1861. Headquarters at 58 Pall Mall, London, S. W. Annual meeting, July. *President*, H. R. H. the Prince of Wales; *Vice-Presidents*, H. R. H. the Duke of Cambridge, the Duke of Teck, the Marquis of Drogheda, Lord de Ros, Earl of Ross and James Glaisher; *Secretary*, Arthur James Melhuish; *Assistant Secretary*, A. Newton Melhuish.

AMATEUR PHOTOGRAPHIC RESEARCH CAMERA CLUB.—Established 1894. Meetings, second and fourth Mondays in each month. Headquarters at Windsor Park, Belfast. *President*, S. Greer; *Vice-President*, Jas. Collins; *Treasurer*, R. B. Gardner; *Secretary*, J. C. Davidson, Windsor Park, Belfast, Ireland.

AMATEUR PHOTOGRAPHIC SOCIETY OF MADRAS.—Headquarters Masonic Hall, Mount Road, Madras. Meetings, last Tuesday in each month. *Secretary*, J. L. Van Geyzel.

Arbroath Amateur Photographic Association.—Established 1890. Headquarters, Y. M. C. A. rooms. Meetings, last Tuesday in each month. *President*, Geo. G. Dalgarns; *Vice-President*, R. Moodie; *Treasurer*, Geo. K. Reid; *Secretary*, James Hood, 94 High Street, Arbroath, Scotland.

Ashton-under-Lyne Photographic Society.—Established 1891. Headquarters, 11 Henry Square. Meetings daily. *President*, Dr. A. Hamilton; *Vice-Presidents*, J. W. Kenworthy, C. E. Redfern, T. Glazebrook, Chas. Lord; *Treasurer*, W. Leijh; *Secretary*, R. T. Marsland, 24 Park Parade, Ashton-under-Lyne, England.

Aston Natural History and Photographic Society.—Established 1892. Headquarters, Burlington Hall, High Street. *President*, Dr. Hill Norris; *Vice-Presidents*, Mr. Fisher and W. Tylar; *Treasurer*, F. Wallis; *Secretary*, Fred W. Pilditch, 133 Wills Street, Aston, near Birmingham, England; *Librarian*, Mr. Rallings.

Aylesbury Amateur Photographic Society.—Established 1888. Headquarters, The Victoria Club. Meetings, third Wednesday of each month. *President*, J. G. James; *Secretary*, J. F. Roche, 2 St. Mary's Square, Aylesbury, England.

Barrow Photographic Society.—Annual meeting, May. *Chairman*, W. Dunlop; *Vice-Chairmen*, John Tunius, C. J. Weston; *Treasurer*, F. W. Walton; *Secretary*, John Carless, 192 Dalton Road, Barrow, England; *Assistant Secretary*, Thos. Huddlestone.

Bath Photographic Society.—Established 1888. Headquarters, Bath Royal Literary and Scientific Institution. Annual meeting, February. *President*, Mr. Perren; *Vice-Presidents*, G. F. Powell, E. Lambert; *Sscretary* and *Treasurer*, W. Middleton Ashman, 12A Old Bond Street, Bath, England.

Batley and District Photographic Society.—Established 1894. Headquarters, Technical School. *Psesident*, J. J. Jubb; *Vice-Presidents*, Percy Sheard, C. Naylor; *Treasurer*, A. Bagshaw; *Secretary*, A. S. Fox, Springfield Villa, Batley, England.

Bedford and District Camera Club.—Established 1890. Headquarters, Bedford Library. Not in active condition. *Secretary*, W. E. Ison, Hughendon, Bedford, England.

Belfast Y. M. C. A. Camera Club.—Established 1889. Annual meeting, May. *President*, Wm. Swanston, F.G.S.; *Vice-Presidents*, W. J. D. Walker, W. Strain, F. Megarry and J. H. Hamilton; *Secretary* and *Treasurer*, J. McCleery, 14 Wellington Place.

Beverly Photographic and Sketching Society.—Established 1893. *President*, E. R. B. Hall-Watt; *Vice-Presidents*, Rev. Bramwell C. Burton, Rev. F. J. Hall; *Treasurer*, A. W. Pickering; *Secretary*, T. J. Morley, Toll Gavel, Beverley, East Yorkshire, England.

Birkenhead Photographic Association.—Established 1884. Headquarters, Y. M. C. A. Building. Meetings, third Tuesday in each month. *President*, Thomas Mansell; *Vice-President*, Chas. B. Reader; *Treasurer*, A. F. Edwards; *Secretary*, Charles Male, 28 Grange Mount, Birkenhead, England.

Birmingham Photographic Society.—Established 1884. Headquarters, Colonnade Hotel, New Street. Meetings, Tuesdays. *President*, Sir J. B. Stone; *Vice-Presidents*, W. Jones, E. C. Middleton, G. F. Lyndon; *Treasurer*, E. Winn; *Secretary*, T. W. Robinson, 63 Temple Row, Birmingham, England.

Blackburn and District Photographic Society.—Established 1890. *Secretary*, W. Y. Gowans, 27 King William Street, Blackburn, England.

Blackheath Camera Club.—Established 1891. Headquarters, The Art Club, Bennett Park. Meetings, Wednesdays, fortnightly. *President*, W. M. H. Christie; *Vice-Presidents*, E. Clark, I. T. Field; *Treasurer*, A. W. Young; *Secretaries*, W. Phillips and S. B. Earle, Brantwood Lodge, Burnt Ash Hill, Lee, London, S. E., England.

Blairgowrie Photographic Association.—Organized February 13, 1894. *President*, A. Geekie; *Vice-President*, Dr. Hood; *Treasurer*, J. T. Gibson; *Secretary*, A. Tolkarde.

Bolton Photographic Society.—Established 1879. Headquarters, 10 Rushton Street, Bolton. Meetings, first Tuesday in each month, from October to May. *President*, J. R. Bridson; *Vice-Presidents*, B. H. Abbott, E. N. Ashworth, W. Banks, J. Boothroyd, R. Harwood, W. Knowles, J. Taylor; *Treasurer* and *Secretary*, C. K. Dalton, 50 Higher Bridge Street, Bolton, England.

Border Amateur Photographic Association.—Established 1892. Headquarters, The Studio, 36 High Street, Galashiels. *President*, Rev. W. Burnet Thompson; *Vice-President*, F. A. Blair; *Secretary*, B. Cartwright, 50 High Street, Galashiels, N. B.

Bournemouth Scientific and Antiquarian Society, Photographers' Section.—Established 1890. *President*, J. W. Bennett; *Vice-Presidents*, Rev. J. R. Husband, M.A., and Dr. Hyla Greves; *Secretary*, E. Greenleaves, Priory Mansions, Bournemouth, England.

Boys' Own Postal Photographic Club.—Established 1890. For the circulation of prints and criticisms thereon. *Secretary*, J. E. Hardwich, 7 Bedford Terrace, Sunderland, England.

Bradford Photographic Society.—Established 1884. Headquarters, Chamber of Commerce. Meetings, alternate Wednesdays. *President*, F. R. Sutcliffe; *Vice-Presidents*, I. Sonnenthal, W. H. Scott, W. Halstead; *Treasurer*, I. P. Burgess; *Secretary*, J. E. Shaw, 143 Wilmer Road, Heaton, Bradford, England.

Brechin Photographic Association.—Established 1888. Headquarters, 14 St. Mary Street. Meetings, third Wednesday of each month. *President*, William Shaw Adamson; *Vice-Presidents*, J. Ireland, I. Buchanan; *Curator*, D. B. Robertson; *Treasurer*, James Mitchell; *Secretary*, James D. Ross, 6 High Street, Brechin, N. B.

Brighouse Photographic Society.—*President*, W. Smith; *Vice-Presidents*, G. A. Farrer, A. H. Ormrod, G. Hepworth; *Treasurer*, F. H. Leyden; *Secretary*, J. H. Georgeson, Telephone Building, Huddersfield Road, Brighouse, England.

Brighton and Sussex Natural History and Philosophical Society (Photographic Section).—Established 1892. Headquarters, Public Library, Church Street. *Chairman*, J. P. Slingsby Roberts; *Secretary*, George Foxall, "Woodlands," Port Hall Road, Brighton, England.

Bristol and West of England Amateur Photographic Association.—

Established 1876. Headquarters, Literary and Philosophic Club, Berkeley Square, Bristol. *President*, H. A. Hood Daniel; *Vice-Presidents*, E. Brightman and Colonel Playfair; *Treasurer*, W. Moline; *Secretary*, M. Lavington, The Avenue, Redland, Bristol, England.

BRISTOL CAMERA SOCIETY.—Established 1886. Headquarters, Kensington School of Art, 31 Berkeley Square, Bristol. *President*, C. Bryant; *Vice-President*, T. Routledge; *Treasurer*, G. L. Wood; *Secretary*, E. R. Jakeways, Hope Villa, St. Mark's Road, Stapleton Road, Bristol, England.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—Established 1831. *President*, Most Hon. the Marquis of Salisbury; *Vice-Presidents*, Earl of Jersey, Lord Wantage, Earl of Rosebery, Bishop of Oxford, Lord Rothschild, Lord Kelwin, the Vice-Chancellor of Oxford University, Sir W. R. Hanson, Sir B. Samuelson, Sir Henry Dyke Acland, Rev. the Master of Pembroke College, Dr. J. J. Sylvester; *Treasurer*, Prof. Arthur W. Rucker; *Secretary*, G. Griffiths, College Road, Harrow, England.

BRIXTON AND CLAPHAM CAMERA CLUB.—Established 1889. Headquarters, Clarence Rooms, 376 Coldharbor Lane. Annual meeting, January. *President*, Dr. J. Reynolds; *Vice-Presidents*, J. W. Coade, W. H. Harrison and G. P. Wyatt; *Treasurer* and *Curator*, R. G. F. Kidson; *Secretary*, P. R. Pinder.

BURNLEY PHOTOGRAPHIC SOCIETY.—Established 1885. Headquarters, Bank Chambers, Hargreaves Street. Meetings, last Wednesday in each month. *President*, John Butterworth; *Vice-Presidents*, J. Thursby, J. L. Lee, J. Rawcliffe, J. C. Brumwell, D. Drew, W. C. Hargreaves, T. Edmondson; *Treasurer* and *Secretary*, Jesse L. Altham, Bank Chambers, Burnley, England.

BURTON-ON-TRENT NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY (Photographic Section).—Established 1889. Headquarters, 46 High Street. Meetings, first Thursday in each month. *President*, R. Churchill; *Secretary*, R. N. Blackburn, 58 Blackpool Street, Burton-on-Trent, England.

BURY PHOTOGRAPHIC AND ARTS CLUB.—Established 1882. Headquarters, 14 Market Street. *President*, E. W. Mellor; *Vice-Presidents*, W. Booth, R. Grundy, C. H. Openshaw; *Treasurer*, T. R. Bertwistle; *Secretary*, R. Wood, 11 Bolton Street, Bury, Lancashire, England.

CAMBRIDGE UNIVERSITY PHOTOGRAPHIC SOCIETY.—Established 1881. *Secretary*, M. Howe, Trinity College, Cambridge, England.

CAMERA AND COMPANY POSTAL PHOTOGRAPHIC CLUB.—Established 1891. *Secretary*, Albert Forrest, 14 Market Street, Poutypridd, Wales.

CAMERA CLUB.—Established 1885. Headquarters, 28 Charing Cross Road, London, W. C. *President*, Capt. W. de W. Abney; *Librarian*, Lyonel Clark; *Secretary*, C. G. Murrell.

CARDIFF PHOTOGRAPHIC SOCIETY.—Established 1886. Headquarters, 31 Balcony Arcade, Queen Street. Meetings, Fridays. *President*, S. W. Allen; *Vice-Presidents*, J. Watson, W. Insole, T. Franklen, E. H. Burton, A. Keller, C. F. Gooch; *Treasurer*, G. H. Wills, Jr.; *Secretary*, T. H. Faulks, 127 Bute Roads, Cardiff, Wales.

CARLISLE AND COUNTY AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1885. Headquarters, Viaduct Hotel, Carlisle. *President*, J. Corbett; *Vice-President*, C.

S. Hall; *Treasurer*, I. Robson; *Secretary*, John Atkinson, 55 South Pettrel Street, Carlisle, England.

Central Photographic Club.—Established 1893. Headquarters, Coleman's Hotel, Henrietta Street, Covent Garden. *President*, Geo. Mason; *Treasurer*, E. J. Wall; *Secretaries*, W. Fenton Jones, 12 King Edward's Road, Hackney, London, N. E., and Chas. H. Oakden, 51 Melbourne Grove, East Dulwich, London, S. E., England.

Cheltenham Amateur Photographic Society.—Established 1865. Headquarters, College Pharmacy, Bath Road, Cheltenham. *President*, Gen. F. Dawson; *Vice-President*, Col. H. M. Saunders; *Secretary*, Philip Thomas, York. House, Cheltenham, England.

Chester Society of Natural Science and Literature.—Established 1887. Headquarters, Grosvenor Museum, Chester. *Chairman*, Henry Stolterfoth; *Secretary* and *Treasurer*, J. H. Speneer, 36 Bridge Street, Chester, England.

Chorley Photographic and Sketching Club.—Established 1894. Headquarters, West Street. *President*, John Stanton; *Vice-President*, H. R. Downing; *Treasurer*, R. Gill; *Secretary*, Thomas Brindle, 62 Market Street, Chorley, England.

City and Guilds of London Institute Photographic Society.—Established 1887. Headquarters, Technical College, Leonard Street, Finsbury, London, E. C. *President*, Dr. S. P. Thompson ; *Vice-Presidents*, Prof. R. Meldola, J. C. Evans ; *Treasurer*, T. H. Norris ; *Secretary*, L. G. Upcott Gill.

Cleveland Camera Club.—Established 1888. Headquarters, Literary and Philosophical Society Rooms, Middlesborough. *President*, W. W. Stainthorpe ; *Vice-Presidents*, F. H. Marshall, R. T. Allison ; *Treasurer* and *Secretary*, J. J. Hallam, 11 Amber Street, Saltburn-by-the-Sea, England.

Clydesdale Camera Clud.—Established 1889. Headquarters, Wemyss Bay, N. B., Private Circulating Club. *President*, Henry Erskine Gordon ; *Secretary*, Miss Burns, Castle Wemyss, Wemyss Bay, Scotland.

Colne Camera Club.—Established 1893. Headquarters, Cloth Hall, Colne. *President*, Rev. T. Leyland ; *Vice-Presidents*, J. Duckworth, H. Hewitt, J. Hey ; *Treasurer*, J. Ratcliffe ; *Secretary*, R. Frankland, 8 Earle Street, Colne, Lancashire, England.

Cornish Camera Club.—Established 1888. Headquarters, Science Schools, Penzance, Cornwall. *President*, W. E. Bailey ; *Vice-President*, B. Vivian ; *Treasurer*, W. H. Percy ; *Secretary*, H. Tonkin, 22 Market Place, Penzance, Cornwall, England.

Coventry and Midland Photographic Society.—Established 1883. Headquarters, Y. M. C. A. Rooms, Cross Cheaping, Coventry. *President*, Wm. Andrews; *Vice-Presidents*, W. R. Goade, F. W. Hardy, F. J. Harker; *Treasurer*, W. L. J. Orton; *Secretary*, A. B. Clarke, Hampton House, Coventry, England.

Crewe Amateur Photographic Society.—Established 1889. Headquarters Studio, Chester Bridge. *President*, Rev. W. G. Rainsford; *Vice-Presidents*, E. Booth, W. Eardley; *Treasurer*, John Cherrey; *Secretary*, T. Gorrell, 106 Edleston Road, Crewe, England.

Crewe Scientific Society (Photographic Section).—Established 1891. Headquarters, Mechanics' Institute. *President*, A. W. Hignett; *Treasurer*, I. Kendrick; *Secretary*, W. Bispham, 60 Samuel Street, Crewe; *Assistant Secretary*, Jos. Laing, Victoria Street, Crewe, England.

CROMWELL PHOTOGRAPHIC CLUB.—Established 1891. Headquarters, Cromwell Hotel, Great Yarmouth, *President*, R. H. Inglis, Palgrave; *Treasurer*, T. W. Swindell; *Secretary*, Charles Rumbold, 4 Dene Side, Great Yarmouth, Eng.

CROYDON CAMERA CLUB.—Established 1890. Headquarters, 56 George Street. Annual meeting, February. *President*, Hector Maclean, F. G. S.; *Vice-President*, S. Herbert, M. P., F. T. Eldridge, J.P., and F. Foss, J.P.; *Secretary*, G. R. White, 55 Albert Road, Croydon, England; *Assistant Secretary* and *Librarian*, H. E. Holland.

CROYDON MICROSCOPICAL AND NATURAL HISTORY CLUB (Photographic Section).—Established 1870. Headquarters, Public Hall, George Street. Croyden. *President*, H. Franklin Parsons; *Treasurer*, Edward B. Sturge; *Secretary*, Henry D. Gower, 16 Wandle Road, Croydon, England.

CYCLISTS' PHOTOGRAPHIC PORTFOLIO CLUB.—Established 1886. Private circulating club for mutual criticism of members' print. *Secretary*, W. L. J. Orton, 7 Bishop Street, Coventry, England.

DARLINGTON PHOTOGRAPHIC SOCIETY.—Established 1887. Headquarters, Imperial Hotel. Annual meeting, November. *President*, James Robinson; *Vice-President*, L. W. Williamson; *Treasurer*, A. Sanders; *Secretary*, P. J. Cooper, 68 North Road, Darlington, England.

DENTON PHOTOGRAPHIC SOCIETY.—Established 1893. Headquarters, 33 Ashton Road, Denton, England. *President*, Rev. Lawrence Scott; *Treasurer*, Edgar Wilde; *Secretary*, J. Edwards.

DERBY PHOTOGRAPHIC SOCIETY.—Established 1884. Headquarters, Smith's Restaurant, Victoria Street. Annual meeting, January. *President*, Capt. W. de W. Abney; *Vice-President*, B. Keene; *Treasurer*. A. B. Hamilton; *Secretary*, T. A. Scotton, 9 Church Street, Derby, England.

DEVON AND CORNWALL CAMERA CLUB.—Established 1888. Headquarters, The Athenæum, Plymouth. *President*, Lieut.-Col. R. Barrington Baker; *Vice-Presidents*, R. Burnard, W. G. Tweedy; *Treasurer*, C. Russel Rendle; *Secretary*, R. Hansford Worth, 42 George Street, Plymouth, England.

DEVONPORT CAMERA CLUB.—Established 1891. Headquarters, Odd Fellows' Hall. *President*, Col. R. W. Stewart; *Vice-Presidents*, W. Waycott, C. Croydon, E. J. Seymour, Lieut.-Col. J. Thacker; *Treasurer*, J. Crook; *Secretary*, C. H. Moore, 18 George Street, Liverpool, England.

DEWSBURY AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Technical School.

DORSET AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1886. Headquarters, Dorchester. *President*, Rev. W. Miles Barnes; *Secretary* and *Treasurer*, Rev. T. Perkins, M.A., F.R.A.S., Turnworth Rectory, Blandford, Dorset, England.

DUBLIN Y. M. C. A. CAMERA CLUB.—Established 1891. *President*, Prof. C. R. Tichborne; *Treasurer*, G. A. Parnell; *Secretary*, L. Davidson, 32 Manor Street, Dublin, Ireland.

Dukinfield Photographic Society.—Established 1888. Annual meeting, April. *President*, S. Woolley; *Vice-Presidents*, S. T. Ainsworth, J. W. Hadfield and J. T. Lees; *Librarian*, H. Broadbent; *Treasurer*, I. Winterbottom; *Secretary*, W. H. Shirley.

Dundee and East of Scotland Photographic Association.—Established 1879. Headquarters, Lamb's Hotel, Dundee. Annual meeting, May. *President*, J. D. Cox; *Vice-Presidents*, Wm. Salmond, Dr. J. K. Tulloch; *Secretary*, U. C. Baird, Broughty Ferry, N. B. Scotland.

Dunstable Photographic Society.—Established 1894. Headquarters, Anchor Sate, Dunstable. *President*, L. C. P. Thring; *Vice-President*, W. G. Smith; *Treasurer*, A. Gutteridge; *Secretary*, Edward Hare, The Poplars, Dunstable, England.

Durham City Camera Club.—Established 1892. Headquarters, Shakespeare Hall, North Road. *President*, Rev. H. E. Fox; *Vice-Presidents*, E. White and Prof. Pearce; *Treasurer*, W. Gray; *Secretary*, R. Hanxwell, The Avenue, Durham, England; *Assistant Secretary*, T. Harker; *Auditor*, R. H. Blythe; *Lanternist*, R. Hauxwell.

Eastbourne Photographic Society.—Established 1892. Headquarters, Natural History Society's Rooms. Annual meeting, January. Meetings, alternate Wednesdays. *President*, H. Habgood; *Vice-President*, H. M. Whitley, *Secretary*, John J. Holloway, 11 Hyde Gardens, Eastbourne, England.

East Grinstead Photographic Society.—Established 1893. *President*, C. E. Collins; *Vice-President*, W. Lloyd; *Secretary*, A. Clark.

East London Photographic Society.—Established 1891. Annual meeting, March. *President*, John H. Gear; *Vice-Presidents*, E. Stone, C. Tyler, M. A. Wilkinson; *Librarian*, S. Aldridge; *Lanternist*, C. Day, Jr.; *Secretary* and *Treasurer*, L. E. Marshall, 125 High Street, Shoreditch, London, England; *Assistant Secretary*, G. E. Bennett, 43 Mitchell Street, Bartholomew Square, London, E. C., England.

Edinburgh Photographic Club.—Established 1881. Headquarters, 38 North Castle Street. *Convener*, James Crighton; *Treasurer*, T. Wardle, Jr.; *Secretary*, G. G. Mitchell, 139 Dalkeith Road, Edinburgh, Scotland.

Edinburgh University Photographic Society.—Established 1890. Headquarters, Bristo Place. *President*, Dr. T. Drinkwater; *Vice-President*, Dr. Logan Turner; *Secretary*, H. O. Hobson, The University Union, Edinburgh, Scotland.

Edinburgh Photographic Society.—Established 1861. Headquarters, 38 Castle Street. *President*, Dr. T.W.Drinkwater; *Treasurer*, Jas.McGlashan; *Secretary*, Thos. Barclay, 180 Dalkeith Road, Edinburgh, Scotland.

Exeter Amateur Photographic Society.—Established 1890. Headquarters, City Chambers, Gandy Street. Annual meeting, January. *President*, Dr. James Cheese; *Vice-President*, Chas. Cole; *Treasurer*, J. Hinton Lake; *Secretary*, Rev. John Sparshatt, Fairfield House, Alphington Road, Exeter, England.

Fairfield Camera Club.—Established 1891. *President*, T. E. C. Wilson; *Vice-President*, H. Holt; *Treasurer*, S. H. Smith; *Secretary*, F. H. Elsby, Rock Farm, Bebington, Cheshire, England.

Fakenham District Camera Club.—Established 1892. Headquarters, Temperance Hotel, Fakenham. Annual meeting, October. Meetings, first and third Wednesdays in each month from October to May and first Wednesday in each month from June to September. *President*, Algernon Digby; *Vice-Presidents*, Rev. A. E. Humphreys, Rev. W. Martin, Thos. Charlton; *Treasurer* and *Secretary*, Henry Newson, The Square, Fakenham, Norfolk, England.

Falkirk Amateur Photographic Association.—Established 1889. Headquarters, Melville Street. Meetings fortnightly. *President*, Geo. Sheriff; *Vice-President*, T. T. Blockadder; *Treasurer* and *Assistant Secretary*, W. C. Murray, High Street, Falkirk.

Farnworth and District Photographic Society.—Established 1892. Headquarters, 148 Albert Road. Meetings, first and third Wednesdays in month. *President*, Mayor Ansdell; *Vice-Presidents*, W. H. Higgins, Dr. Spencer, W. S. Spencer, F.C.S., and Harold S. Grimshaw; *Treasurer*, T. P. Brearley; *Secretary*, William Ramsden, Woodland Vilas, Farnworth, England.

Faversham Institute Photographic Society.—Established 1890. Headquarters, Faversham Institute. Annual meeting April. Meetings, third Tuesday in each month. *President*, Viscount Throwley; *Vice-Presidents*, Dr. E. J. Evers, Capt. C. F. Hooper, W. C. Stunt; *Secretary* and *Treasurer*, C. H. Semark, Stone Street, Faversham, England.

Friends' Photographic Society.—Established 1888. Headquarters, Stoke Newington, London. Private social club. Meetings, first Wednesday in each month. *Secretary*, A. J. Ransome, Audley Lodge, Uplands Park, Enfield.

Glasgow and West of Scotland Amateur Photographic Association.—Established 1883. Headquarters, 180 West Regent Street, Glasgow. Annual meeting, January. *President*, Stewart Smith; *Vice-President*, A. Lindsay Miller; *Treasurer*, J. Robertson Miller; *Librarian*, N. G. Reid; *Secretaries*, Wm. Goodwin, 3 Lynedoch Street, Glasgow, Scotland, and J. C. Oliver, 2 Royal Terrace, Glasgow, Scotland.

Glasgow Photographic Association.—Established 1862. Headquarters, 207 Bath Street. Meetings, first Thursday in each month from November to May, inclusive. *President*, John Stuart; *Vice-Presidents*, J. Craig Annan and A. Lindsay Miller; *Treasurer*, Geo. Bell; *Secretary*, Fred. Mackenzie, 122 Wellington Street, Glasgow, Scotland.

Glenalmond Photographic Club.—Established 1890. Headquarters, Trinity College, Glenalmond, Perthshire. Meetings every alternate Saturday during school term. *President*, Arthur S. Reid, M.A., F.G.S.; *Vice-President*, Rev. the Warden of Glenalmond and G. Caldwell; *Treasurer*, F. H. O. Harrison; *Secretary*, H. de Putron, Trinity College, Glenalmond, Perthshire, Scotland.

Glossop Dale Photographic Society.—Established 1883. Headquarters, Norfolk Square, Glossop, Manchester. Meetings, Wednesdays and Saturdays. *President*, Edw. Partington, J.P.; *Vice-Presidents*, Major Sidebottom, M.P., James Sidebottom, J.P., and S. H. Wood; *Treasurer*, J. Hardman; *Secretary*, I. W. Sharpe, Glossop, Manchester, England.

Gloucestershire Photographic Society.—Established 1887. Headquarters, School of Science, Gloucester. Annual meetings, April. Meetings, Mondays usually. *President*, G. Embrey, F.C.S ; *Vice-President*, H. S. Crump ; *Treasurer*, Dr. Hodges ; *Secretary*, A. H. Pomeroy, Gloucester, England.

GOLDSMITH INSTITUTE CAMERA CLUB.—Established 1893. Headquarters, Goldsmith's Institute, New Cross, London, S. E. Annual meeting, March. Meetings, second and fourth Mondays in each month. *President*, J. W. Penfold; *Vice-Presidents*, J. S. Redmayne, Miss E. Griffiths, A. G. Bloxam, A. L. Spiller; *Secretary*, Jas. H. Ridge, 84 Manor Road, Brockley, London, S. E., England.

GOOLE PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, The Exchange. *President*, Robert Blair; *Vice-Presidents*, T. C. Turton, J. T. Hynes; *Treasurer* and *Secretary*, S. Wells, River House, Airmyn, Goole, England.

GORDON CAMERA CLUB.—Established 1892. Headquarters, The Gordon Club, Braintree. *President*, H. J. Cunnington; *Secretary*, W. Clark, Coggeshall Road, Braintree, England.

GOSPORT PHOTOGRAPHIC SOCIETY.—Established 1893. Headquarters, 46 High Street, Gosport. Annual meeting, February. Meetings, second and fourth Wednesday in each month. *President*, R. E. Froude, R.N.; *Vice-Presidents*, Geo. Churther, T. E. Williams, Rev. L. J. Matthews; *Treasurer*, W. B. Smith; *Secretary*, J. Herbert Fisher, 55 Victoria Road, S., Southsea, Hauts, England.

GRAPHIC SOCIETY.—Established 1885. Headquarters, Plymouth. *President*, S. Resswell; *Treasurer*, G. F. Watson; *Secretary*. J. S. Hawker, Multy House, Plymouth, England.

GREAT YARMOUTH AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1893. Headquarters, Two Bears Hotel, Southtown, Great Yarmouth. Meetings, alternate Monday evenings. *Secretary* and *Treasurer*, Geo. T. Davis, 4 Market Place, Great Yarmouth.

GREAT YARMOUTH CAMERA CLUB.—Established 1890. Headquarters, The Tower, Gorleston. Annual meeting, December. *President*, Dr. Adcock; *Vice-President*, F. D. Palmer; *Treasurer*, John Taylor; *Secretary*, H. Harvey-George, The Tower, Gorleston, Great Yarmouth, England.

GREENOCK CAMERA CLUB.—Established 1888. Headquarters, Greenock Museum, Kelly Street. Annual meetings, April. Meetings, third Thursday in each month from September to April, inclusive. *President*, Alexander Robb; *Vice-President*, James Wright; *Treasurer*, Duncan Nicol; *Secretary*, Wm. Blair, 40 Brisbane Street, Greenock, Scotland.

GREENWICH PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, Lecture Hall, Royal Hill, Greenwich. Meetings, first Wednesday in each month. *President*, A. Haddon; *Vice-Presidents*, G. S. Creswick, H. H. Turner; *Treasurer*, Chas. Churchill; *Secretary*, Leonard J. Atkinson, 193 Greenwich Road, London, S.E., England,

GRIMSBY AND DISTRICT PHOTOGRAPHIC SOCIETY.—New organization, established June 22, 1894. *President*, R. C. Long; *Vice-Presidents*, Dr. Simpson and H. Barker; *Secretary*, A. F. Flint; *Treasurer*, A. E. Matthews; *Librarian*, M. Hanson.

GUILFORD PHOTOGRAPHIC SOCIETY.—Established 1890. Headquarters, 36 High Street. Annual meeting, March. Meetings, second Tuesday in each month. *President*, Earl of Onslow, G.C.M.G.; *Vice-Presidents*, J. F. Leese, M.P., Q.C., G. J. Jacobs, J. Russell; *Treasurer*, J. H. Nunn; *Secretary*, A. E. Moon, 36 High Street, Guilford, Surrey, England.

Hackney Photographic Society.—Established 1889. Annual meeting, May. *President*, Dr. Roland Smith; *Treasurer*, J. O. Grant; *Secretary*, W. Fenton Jones, 12 King Edward Road, Hackney, London, N. E., England. *Assistant Secretary*, A. D. Fort; *Curator*, A. Dean.

Halifax Camera Club.—Established 1891. Headquarters, 12a Crossley Street, Halifax. Annual meeting, June. Meetings, Tuesdays and Fridays. *President*, J. Ingham Learoyd; *Vice-Presidents*, Thos. Illingworth, Benj. Burgley; *Treasurer*, The President; *Secretary*, Herbert Walsh, Thornleigh, Halifax, England.

Haltwhistle and District Photographic Society.—Established 1889. Headquarters, Haltwhistle. Meetings monthly. *President*, W. R. Spiers; *Vice-President*, Geo. Clark; *Secretary* and *Treasurer*, David Macadam, Carlisle City and District Bank, Haltwistle, England.

Haslingden Photographic Society.—New organization established April, 1894. *President*, H. A. Smith; *Vice-President*, T. F. Bradbury; *Secretary*, Edward Anderson, 3 Gyke Street, Haslingden, near Manchester, England.

Harringay and Finsbury Park Social Photographic Society.—Established 1893. Meetings, second Thursday in each month. *President*, Chas. Watson; *Treasurer* and *Secretary*, Clarence Frith, 91 Burgoyne Road, Harringay, London, England.

Hastings and St. Leonards Photographic Society.—Established 1888. Meetings, third Thursday in each month. *President*, Wilson Noble; *Vice-Presidents*, Lord Brassey, J. H. Bromfield, J. H. Mayor, A. C. Routh, W. Shuter, W. Stubbs, Macer Wright; *Treasurer*, Rev. A. B. Cotton; *Secretary*, Harry Gibson, 4 St. James' Vilas, Hastings, England.

Helios Postal Photographic Club.—Established 1887. *Secretary* and *Treasurer*, W. Cooper, Marston, Frome, Somerset, England.

Herefordshire Photographic Society.—Established 1888. Headquarters, Mansion House, Hereford. Annual meeting, November. Meetings, first Tuesday in each month (Winter), first Thursday (Summer). *President*, Alderman T. Blake, J.P.; *Vice-Presidents*, Alfred Watkins, J. Parker, Rev. G. H. Morgan, T. J. Salwey, J. Wilson; *Treasurer*, W. E. Haines; *Secretary*, Cecil Gethen, 9 St. Nicholas Street, Hereford, England.

Hexham Photographic Society.—Established 1892, Headquarters, Waverly Temperance Hotel. Meetings, first Tuesday in each month. *President*, Chas. E. Straker; *Vice-Presidents*, Jasper Gibson, Charles Liddell, L. C. Lockhart; *Treasurer*, Rev. A. Cross; *Secretary*, J. Fred. Russell, Shaftot Leazes, Hexham, England.

Holborn Camera Club.—Established 1889. *President*, D. R. Lowe; *Vice-Presidents*, Fred. Brocas, S. T. Chang; *Treasurer*, A. Bell; *Secretary*, F. J. Cobb, 100 High Street, London, W. C., England; *Assistant Secretary*, H. Thompson; *Librarian*, J. Brittain.

Holmfirth Amateur Photographic Society.—Established 1885. Headquarters, Holmfirth, Huddersfield. Meetings, last Friday in each month. *President*, Arthur Preston; *Treasurer* and *Secretary*, David Bilson, Birchin House, Holmfirth, Huddersfield, England.

Hove Camera Club.—Established 1892. Headquarters, Hove Town Hall. Annual meeting, April. *President*, G. B. Woodruff, J.P.; *Vice-Presidents*, R. Dawson, M.D., W. A. Hollis, M.D., W. Jago, H. H. Taylor, Miss Fuller, J. H. Fowler, G. J. Caithness; *Treasurer*, C. Job; *Secretary*, I. Williamson, 144 Church Road, Hove, England.

Huddersfield Naturalists' and Photographic Society.—Established 1893. Headquarters, Y. M. C. A. Lecture Room. Meetings, last Saturday in each month. *President*, F. Crosland; *Vice-Presidents*, H. G. Brierley, T. W. Woodhead; *Secretary*, A. Clarke, 9 St. Andrew's Road, Huddersfield, England.

Hull Photographic Society.—Established 1884. *President*, John Pybus; *Vice-President*, Rev. W. Hay-Tea; *Treasurer*, A. N. Jamieson; *Librarian*, B. M. Stokes; *Secretaries*, A. S. White, 141 Westbourne Avenue, Hull, England; E. E. Cohen, 127 Beverley Road, Hull, England.

Ipswich Photographic Society. Established 1888. Headquarters, Museums, Ipswich. Annual meeting, February. *President*, J. Dixon Piper; *Vice-Presidents*, Evan Edwards, E. R. Pringle, Mr. Woolnough; *Secretary* and *Treasurer*, J. C. Wiggin, St. Matthew's Street, Ipswich, England.

Isle of Thanet Photographic Society.—Established 1888. Headquarters, St. George's Church Club, Ramsgate. Meetings, Mondays or Wednesdays in each month. *President*, Rev. H. Bartram; *Vice-Presidents*, Rev. H. Biddell, Rev. C. E. Eastgate, G. Dowker, W. Saunders; *Treasurer* and *Secretary*. A. D. Sackett, 23 Liverpool Lawn, Ramsgate, England.

Jarrow-on-Tyne and District Photographic Society.—New organization, established 1894. *President*, Dr. Jennings; *Vice-President*, Mr. Wallis; *Treasurer*, Mr. Menzies; *Secretary*, Mr. Hughson.

Jersey Amateur Photographic Society.—Established 1890. Headquarters, St. Heliers. Annual meetings, April. Meetings first Monday in each month. *President*, Lieut.-Col. E. Jackson; *Vice-President*, Capt. G. C. Swan; *Secretary* and *Treasurer*, Col. J. W. Butler, 6 Waterloo Street, St. Heliers, Jersey, England.

Keighley and District Photographic Association.—Established 1889. Headquarters, Mechanics' Institute, North Street. Annual meeting, October. Meetings, first and third Tuesdays in each month. *President*, Saml. Baerston; *Vice-Presidents*, J. W. Laycock, Thos. Heaps; *Treasurer*, Walter Mitchell; *Secretary*, Jno. Gill, 27 Highfield Lane, Keighley, England.

Kendal Literary and Scientific Institution.—Established 1886. Headquarters, Museum Library. Annual meeting, September. Meetings, fourth Monday in each month. *President*, Isaac Braithwaite; *Vice-President*, Frank Wilson; *Treasurer*, T. N. Ritson; *Secretary*, Mrs. A. Mary Wilson, Castle Lodge, Kendal, England.

Kilmarnock and Ayrshire Photographic Society.—Established 1887. Headquarters, Odd Fellows' Building. Annual meeting, October. Meetings, third Saturday in each month from October to April, inclusive. *President*, Thos. Ferguson; *Vice-President*, David Boyd; *Treasurer*, J. S. Bain; *Secretary*, William Paterson, 50 St. Andrews Street, Kilmarnock, Scotland.

King's Lynn Photographic Society.—Established 1894. Headquarters, C. E. Y. M. S. Rooms, Railway Road, Lynn. Meetings, first Tuesday in each month. *President*, S. A. Gurney; *Vice-Presidents*, Rev. H. H. Streeten, C. W. Croad; *Treasurers* and *Secretaries*, H. Tilson, R. T. Browne, Railway Road, Lynn, England.

KING'S LYNN Y. M. C. A. PHOTOGRAPHIC CLUB.—Established, 1891. Headquarters, Y. M. C. A. Rooms, St. James Street. Meetings, second Tuesday in each month. *President*, G. M. Bridges; *Secretary*, William Winch, St. James Street, King's Lynn, England.

KINGSTON-ON-THAMES AND DISTRICT PHOTOGRAPHIC SOCIETY.—Established 1893. Headquarters, 12 Palmer Crescent, Kingston. Meetings alternate Tuesdays. *President*, Rev. G. J. Swinnerton; *Vice-President*, Rev. F. C. Lambert; *Treasurer*, W. M. Robertson; *Secretaries*, Dr. Finney, Queen's Road, Kingston Hill; W. E. Price, Bushey View, Hampton Wick, England.

LANCASTER PHOTOGRAPHIC SOCIETY.—Established 1889. Headquarters, Stonewell, Lancaster. Annual meeting, March. Meetings, last Tuesday in each month. *President*, Alan Garnett; *Vice-Presidents*, J. W. Pickard, H. J. J. Thompson; *Treasurer*, J. Atkinson; *Secretary*, W. Briggs, 21 Cheapside, Lancaster, England.

LANTERN SLIDE EXCHANGE CLUB.—Established 1889. This is a postal photographic society. *Hon. Critic*, Frank Howard; *Secretary* and *Treasurer*, A. J. Richardson, Summerville, Dore-Sheffield, England.

LANTERN SOCIETY.—Established 1890. Headquarters, 20 Hanover Square, W. Annual meeting, November. Meetings, second and fourth Monday in each month from October to April inclusive. *President*, Hon. Slingsby Bethell; *Chairman*, G. M. Nelson; *Secretary*, Commander C. E. Gladstone, R.N., 13 Arlington Street, S. W., London, England.

LEAMINGTON AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1887. Headquarters, Pump Rooms, Leamington. Meetings, monthly. *President*, Surgeon-Gen. Ranking; *Treasurer*, B. Magrath; *Secretary*, Signor Aspa, Priory House. Leamington, England.

LEEDS CAMERA CLUB.—Headquarters, Togg's New Waverley Hotel, Cull Lane. Meetings, alternate Thursdays. *President*, Dr. Thos. Thresh; *Vice-President*, R. Irwin; *Treasurers*, Messrs. W. R. Thompson, Dixon and Hombury; *Secretary*, Chas. B. Hutchinson, 8 Bedford Street, Park Row, Leeds, England.

LEEDS PHOTOGRAPHIC SOCIETY.—Established 1852. Headquarters, Mechanics' Institute, Leeds. Annual meeting, first Thursday in December. Meetings, first Thursday and third Monday in each month. *President*, J. H. Walker; *Vice-Presidents*, Godfrey Bingley, S. A. Warburton; *Treasurer*, Herbert Denison; *Secretaries*, Herbert Denison, H. L. P. Loudon, 12 East Parade, Leeds, England.

LEICESTER AND LEICESTERSHIRE PHOTOGRAPHIC SOCIETY.—Established 1885. Headquarters, Mayor's Parlor, Old Town Hall. Annual meeting, January. *President*, J. Porritt; *Vice-President*, Mr. Joliffe; *Treasurer*, J. Toone; *Secretary*, H. Pickering.

LEIGH PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, Old Grammar School, Leigh. Meetings, first and third Thursdays in each month.

President, Jas. Ward; *Treasurer*, Thos. Haddock; *Secretary*, W. R. Moore, 17 Railway Road, Leigh, Lancashire, England.

LEITH AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1886. Headquarters, 165 Constitution Street. Annual meeting, January. Meetings, last Tuesday in each month. *President*, Wm. Dougall; *Vice-President*, A. D. Guthrie; *Treasurer*, M. Campbell; *Secretary*, Alex. Pitkethly, 8 Wilkie Place, Leith, Edinburgh, Scotland.

LEWES PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Fitzroy Library, High Street. Annual meeting, September. Meetings, first Tuesday in each month. *President*, Councellor Wightman; *Vice-President*, J. Tunks; *Treasurer* and *Secretary*, Geo. Carpenter, 81 High Street, Lewes, England.

LEWISHAM CAMERA CLUB.—Established 1890. Annual meeting, April. *President*, Rev. J. M. Wright; *Vice-President*, A. H. Miles; *Treasurer*, E. B. Eastwood; *Secretary*, H. M. C. Sprunt, 192 New Cross Road, London, S. E., England; *Assistant Secretary*, H. L. Davis, 95 Cranfield Road, Brockley, London, S. E., England. Professionals may join the club as ordinary members.

LEYTONSTONE CAMERA CLUB.—Established 1890. Masonic Hall, High Road, Leytonstone. Annual meeting, July. *President*, Dr. W. Picket Turner; *Vice-Presidents*, F. W. Byrne, W. B. Whitingham, A. Hornsby-Hinton, D. J. Morgan and T. F. Sanderson; *Hon. Treasurer*, Tom Symmons; *Hon. Secretaries*, F. W. Wates and G. H. Cricks; *Assistant Hon. Sec.* and *Librarian*, W. C. Hall.

LIGHT AND TRUTH POSTAL PHOTOGRAPHIC CLUB.—Established 1890. *Secretary*, Henry E. Trew, 50 Market Street, Poole, Dorset, England.

LINCOLN CAMERA CLUB.—Established 1892. Headquarters, School of Science and Art. Meetings, first and third Fridays in each month. *President*, H. Mantle; *Vice-Presidents*, Rev. Dr. Stott, Rev. Canon Fowler; *Treasurer*, Capt. J. M. Warrener; *Secretary*, Wm. E. Asquith, Jr., 87 Monk's Road, Lincoln, England.

LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1863. Headquarters, Percy Buildings, Eberle Street. Annual meeting, November. Meetings, last Thursday in each month. *President*, Alfred Tyrer; *Vice-Presidents*, G. B. Newton, A. Bradbury; *Treasurer*, P. H. Phillips; *Secretary*, John H. Welch, Percy Buildings, Eberle Street, Liverpool, England.

LIVERPOOL CAMERA CLUB.—Established 1891. Annual meeting, February. Headquarters, 128A Mount Pleasant. *President*, William Tansley; *Vice-Presidents*, J. Pride and H. Sharrock; *Treasurer*, J. Hawkins; *Secretary*, J. Smith, Jr., 76 High Street, Wavertree, Liverpool, England. *Librarian*, T. Russell.

LIVERPOOL CENTRAL Y. M. C. A. CAMERA CLUB.—Established 1889. Headquarters, Association Rooms, 56 Mount Pleasant. Meetings, Wednesdays in each month. *President*, Wm. P. Christian; *Vice-Presidents*, Thos. Jameson, J. Fowler Shone, J. C. Lee; *Treasurer* and *Secrtary*, Herbert Hannah, 104 Moss Grove, Sefton Park, Liverpool, England.

LLANDUDNO CAMERA CLUB AND LANTERN SOCIETY.—Established 1892. Headquarters, Club House, Bodhyfryd Road. Meetings every Thursday. *President*, Lord Mostyn; *Vice-Presidents*, Rev. John Morgan, W. A. Whiston; *Treasurers* and *Secretaries*, A. Campbell, Anneddle, Llandudno, and A. H. Hughes, Rochester House, Llandudno, Wales.

Llanelly Amateur Photographic Society.—Established 1891. Headquarters, Frederick Street. Meetings, first Saturday in each month. *President*, C. W. Mansel Lewis; *Vice-Presidents*, J. H. Rogers, Dr. Roderick; *Treasurer*, W. Thomas; *Secretary*, John Daniell, Dovedale House, Llanelly, Wales.

London and Provincial Photographic Association.—Established 1882. Headquarters, Champion Hotel, 15 Aldergate Street, London. Meetings, Thursdays in each month. *Treasurer* and *Secretary*, T. E. Freshwater, Torriano Avenue, London, N.W., England.

London Social Camera Club.—Established 1886. Headquarters, 265 Strand, W. *President*, Wilson Barrett; *Vice-President*, T. R. Blurton ; *Treasurer*, Geo. Wheeler ; *Secretary*, Wm. H. Cornell, 11 Mason's Avenue, E.C., London, England.

Longton and District Photographic Society.—Established 1894. *President*, W. J. Smith; *Vice-Presidents*, Geo. Hamby, T. P. Hulse; *Treasurer*, S. Ashcroft; *Secretary*, A. R. Miller.

Loughborough Literary and Scientific Society (Photographic Section).—Established 1888. Headquarters, Market Place. *President*, W. C. Burder ; *Secretaries*, Messrs. Kersey and W. Clarke, Forest Road, Loughborough, England.

Louth and District Photographic Society.—Established 1891. Annual meeting, April. Headquarters, 8 Upgate, Louth, Lincolnshire. *President*, F J. Ingoldby; *Treasurer*, E. H. Forman ; *Secretary*, S. F. Clarke, L.D.S.; *Assistant Secretary*, H. C. Bentley.

Lyonsdown Amateur Photographic Association.—Established 1886. Meetings, last Thursday in each month. *President*, Frank Crosbie; *Treasurer* and *Secretary*, Harold Imray, The Grange, Underhill, New Barnet, England.

Macclesfield Photographic Society.—Organized February, 1894. *President*, E. Woodward; *Vice-Presidents*, I. Potts, Dr. Sheldon, Dr. Averill, J. Hodkinson, J. W. Burgess, B. R. Leech and E. Bullock; *Treasurer*, J. Pratt; *Secretary*, S. Barrett, 76 Pownall Street, Macclesfield, England.

Maidstone Amateur Photographic Club.—Established 1888. Headquarters, Old Palace, Maidstone, Kent. Annual meeting, February. Meetings, Fridays in each month. *Treasurer* and *Secretary*, R. P. Grant, Shirley House, Maidstone, England.

Manchester Amateur Photographic Society.—Established 1885. Headquarters, Manchester Athenæum. Annual meeting, January. Meetings, second Tuesday in each month. *President*, J. T. Lees; *Treasurer*, C. Dawson; *Secretary*, F. W. Parrott, Vicarage Lane, Bowdon, Manchester, England.

Manchester Camera Club.—Established 1885. Headquarters, Victoria Hotel, Manchester. Annual meeting, October. Meetings, third Wednesday in each month. *Treasurer*, J. Davenport; *Secretary*, Chas. Dawson, 66 Peter Street, Manchester, England.

Manchester Y. M. C. A. Photographic Club.—Established 1890. Headquarters, 56 Peter Street. Annual meeting, January. Meetings, first Thursday in each month. *President*, A. C. Harrison; *Vice-President*, W. H. Newett; *Treasurer*, G. T. White; *Secretary*, Geo. Goodrich, 56 Peter Street, Manchester, England.

MANCHESTER PHOTOGRAPHIC SOCIETY.—Established 1855. Headquarters, 36 George Street, Manchester. Annual meeting, October. Meetings, second Thursday in each month. *President*, J. Wood; *Treasurer*, W. G. Coote; *Secretary*, W. H. Farrow, 36 George Street, Manchester, England.

MARGATE PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, 20 Market Place. Meetings, last Thursday in each month. *President*, Dr. Elliott; *Vice-President*, Rev. W. Bellau; *Treasurer* and *Secretary*, W. S. Harvey, 20 Market Place, Margate, England.

MIDLOTHIAN CAMERA CLUB.—Established 1889. Headquarters, Lecture Hall, Philosophical Institution, Edinburgh. Annual meeting, November. Meetings, fourth Monday in each month, from October to April. *President*, Hugh Marshall; *Vice-Presidents*, Alexander Thomson, W. Ivison Macadam; *Treasurer*, W. C. Callender; *Secretary*, A. D. Guthrie, Bonnington, Edinburgh, Scotland.

MONKLANDS PHOTOGRAPHIC SOCIETY.—Established 1893. Headquarters, Airdrie, N. B. Meetings, first Tuesday in each month, from October to April, inclusive. *President*, Robert Dunlop; *Vice-President*, Frank Robertson; *Treasurer*, Saml. H. Wood; *Secretary*, Wm. Dixon Gray, 16 Bank Street. Airdrie Scotland.

MUNSTER CAMERA CLUB.—Established 1891. Headquarters, Crawford Municipal School of Science and Art, Cork. Annual meeting, April. *President*, John Day; *Vice-Presidents*, Denny Lane, H. Noblett and Dr. Atkins; *Treasurer*, W. R. Atkins; *Secretary*, R. S. Baker, Patriarch Street, Cork, Ireland; *Assistant Secretary*, E. Newenham.

MUSSELBURGH PHOTOGRAPHIC CLUB.—Established 1894. Headquarters, North Esk Parish Hall. *President*, John Geddes; *Treasurer* and *Secretary*, J. Edington Aitken, 121 Newbigging, Musselburgh, England.

NATIONAL ASSOCIATION OF PROFESSIONAL PHOTOGRAPHERS.—Established 1891. *President*, Thomas Fall; *Vice-Presidents*, Chevalier La Fosse, John E. Shaw, Robert Slingsby, H. J. Whittoch; *Treasurer*, John Crosby; *Secretary*, C. P. Richards, Barrow, England.

NATURALIST FIELD CLUB.—Established 1890. Headquarters, Cambridge Hall, Barrow-in-Furness. Meetings, fourth Thursday in each month. *President*, A. Blechynden; *Vice-Presidents*, W. Dunlop, C. J. Weston; *Treasurer*, F. W. Walton; *Secretary*, John Redhead, 9 Spring Street, Barrow-in-Furness, England.

NEWCASTLE-ON-TYNE AND NORTHERN COUNTIES PHOTOGRAPHIC ASSOCIATION.—Established 1881. Headquarters, Art Gallery, Newcastle-on-Tyne. Annual meeting, October. Meetings, second and fourth Tuesday in each month. *President*, J. Pattison Gibson; *Treasurer*, Fred Park; *Secretary*, Jas. Brown, 31 Market Street, Newcastle-on-Tyne, England.

NEWTOWNARDS CAMERA CLUB.—Established 1894. Headquarters, Regent Street Hall, Newtownards. Meetings, first and third Tuesday in each month. *President*, H. Conway; *Vice-President*, S. H. Simms; *Treasurer*. W. McCullough; *Secretary*, Thos. Drake, Conway Square, Newtownards.

NORFOLK AND NORWICH CAMERA CLUB.—Established 1886. Headquarters, Bell Hotel, Norwich. Annual meeting, January. Meetings, second Monday in each month. *President*, Harvey George; *Vice-Presidents*, Dr. Thompson, M.

Alyar; *Treasurer* and *Secretary*, Col. H. Wood, C.B., 95 Thorpe Road, Norwich, England.

NORTHAMPTONSHIRE NATURAL HISTORY SOCIETY AND FIELD CLUB.—Established 1876. Headquarters, Museum and Grammar School. *President*, H. Mansfield; *Secretary*, J. J. Wetherell, Billing Road, Northampton, England.

NORTHERN PHOTOGRAPHIC AND SCIENTIFIC ASSOCIATION.—Established 1893. Headquarters, Public Hall, Canning Crescent, Wood Green. Meetings, Thursdays. *President*, J. G. Robins; *Treasurer*, T. W. Muskett; *Secretary*, W. H. Rickinson, 1 Lascott Road, Wood Green.

NORTH KENT AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1887. Headquarters, Medical Hall, Edwin Street, Gravesend, Kent. *President*, I. C. Johnson, J.P.; *Vice-President*, E. J. Wall; *Treasurer*, J. H. Morris; *Secretary*, T. L. Winnett.

NORTH LONDON PHOTOGRAPHIC SOCIETY.—Established 1885. Headquarters, Canonbury Tower, London, N. Annual meeting, November. Meetings, first and third Tuesdays in each month. *President*, J. Traill Taylor; *Treasurer* and *Secretary*, W. T. Coventon, 50 Highbury Park, London, N., England.

NORTH MIDDLESEX PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Jubilee House, Hornsey Road, London, N. Annual meeting, January. *President*, J. W. Marchant; *Vice-Presidents*, Chas. Beadle and S. E. Wall; *Treasurer*, Henry Smith; *Curator*, W. H. Laington; *Secretary*, Geo. Gosling, 13 Lausaune Road, Hornsey, London, N., England.

NORTH SURREY PHOTOGRAPHIC SOCIETY.—Established 1887. Headquarters, Knights Hill Road, West Norwood, S. E Meetings, first and third Tuesdays in each month. *President*, J. J. Morrish; *Vice-President*, L. Wolff; *Treasurer* and *Secretary*, R. W. Wilson, 42 Norwood Road, Herne Hill, S. E., England.

NOTTINGHAM MECHANICS' INSTITUTION CAMERA CLUB.—Established 1892. Headquarters, Mechanics' Institute. *President*, Duke of Newcastle; *Treasurer*, H. Derry; *Secretary*, John T. Radford, 3 Colville Villas, Nottingham, England.

NORTHWICH PHOTOGRAPHIC SOCIETY.—New organization, established May, 1894. *President*, Dr. H. J. Liebstein ; *Vice-Presidents*, J. J. Dixon, A. H. Marsh ; *Secretary* and *Treasurer*, E. T. Ward.

OLDHAM PHOTOGRAPHIC SOCIETY.—Established 1867. Headquarters, Oldham Lyceum, Union Street. Annual meeting, last Thursday in October. Meetings every Thursday evening. *President*, J. S. Dronsfield, J.P. ; *Vice-President*, J. Brooks; *Treasurer*, W. Schofield; *Librarian*, B. J. Holt ; *Secretary*, Thomas Widdop, 16 Burnaby Street, Oldham ; *Assistant-Secretary*, I. Hilton Ashton, 114 Shawside, near Oldham, England.

OBAN PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, Oban. *Hon. President*, J. B. Atkinson ; *Hon. Vice-President*, W. Campbell Muir ; *President*, M. A. Scott ; *Vice-President*, J. Maclaine ; *Secretary* and *Treasurer*, Samuel Lawrence, 101 George Street, Oban, Scotland.

OXFORD CAMERA CLUB.—Established 1894. Headquarters, 50 Broad Street, Oxford. Meetings, second and fourth Monday in each month. *Vice-Presidents*, Rev. F. J. Smith, Dr. M. Dugdale Stark ; *Treasurer*, R. A. R. Bennett ; *Secretary*, J. Butham Wilson, 118 High Street, Oxford, England.

Oxford University Photographic Society.—Established 1880. *President*, A. H. C. James; *Treasurer*, J. Walker; *Secretary*, S. Nicholson, New College, Oxford, England.

Paisley Photographic Society.—Established 1857. Headquarters, 9 Gauze Street. *Presidents*, H. H. Smiley and J. Stewart Clark; *Vice-Presidents*, Robert Harris, James Donald, Jr., and James Barr; *Treasurer*, R. Pitblade; *Secretary*, R. N. W. Thompson, 13 Abbey Street, Paisley, Scotland.

Perthshire Society of Natural Science.—Established 1889. Headquarters, Natural Science Hall, South Tay Street, Perth. *President*, A. Thomson; *Secretary*, W. Ellison, 2 Balhousie Street, Perth, Scotland.

Peterborough Photographic Society.—Established 1887. Meetings, first Monday in each month. *President*, G. Kirkwood, M.D.; *Treasurer*, W. Atkinson; *Secretary*, A. W. Nicholls, 11 Cromwell Road, Peterborough, England.

Photographers' Benevolent Association.—Established 1873. Headquarters, Rooms of the Photographers' Society of Great Britain. Annual meeting, February. *President*, George Mason; *Treasurer*, John Spiller; *Committee*, R. Child Bayley, R. Becket, F. H. Berry, C. Faulkner, G. T. Harris, P. G. Hunt, A. Mackie, J. S. Rolfe, R. P. Drage, T. E. Freshwater, H. R. Hume, W. Fenton Jones, E. W. Parfitt and H. S. Ward; *Auditors*, T. Bedding, T. Samuels, J. Guardia and E. J. Wall; *Secretary*, H. Snowden Ward.

Photographic Club.—Established 1879. Headquarters, Anderton's Hotel, Fleet Street, London, E.C. Annual meeting, November. Meetings, Wednesdays in each month. *Trustees*, Frank Haes, A. Cordan; *Treasurer* and *Secretary*, J. A. Sinclair, 26 Charing Cross Road, London, W.C., England.

Photographic Convention of the United Kingdom.—Established 1886. Annual meetings at different cities in the United Kingdom. Meeting for 1895 at Shrewsbury. *President*, Mr. Keene; *Secretary* and *Treasurer*, R. P. Drage, 95 Blenheim Crescent, London, West, England.

Photographic Print Postal Society.—Established 1892. *Secretary*, Jno. T. Collins, Chalfont St. Peter, Slough, England.

Photographic Society of Ireland.—Established 1854. Headquarters, 35 Dawson Street, Dublin. Meetings, second Friday and fourth Thursday in each month. *President*, J. Alfred Scott; *Vice-Presidents*, Jas. Carson, M. Hedley; *Treasurer*, Wm. Bewley; *Secretary*, Jno. A. C. Ruthven, 40 Lower Sackville Street, Dublin, Ireland.

Photographic Society of Great Britain (Royal).—Established 1853. Headquarters, 50 Great Russell Street, Bloomsbury, London, W. C. Annual meeting, February. Ordinary meetings, second Tuesday in each month. Technical meetings, fourth Tuesday in each month, except September. *President*, Sir H. Trueman Wood, M. A.; *Vice-Presidents*, Capt. W. de W. Abney, T. R. Dallmeyer, A. Pringle, J. Spiller; *Treasurer*, G. Scannell; *Librarian*, E. Clifton; *Secretaries*, Chapman Jones, 11 Eaton Rise, Ealing, London, W., and R. Child Bayley, 50 Great Russell Street, Bloomsbury, London, W., England.

Photographic Society of India.—Established 1886. Headquarters, Calcutta. Annual meeting, May. *Presidents*, Col. J. Waterhouse; *Vice-Presidents*, J. G. Apear, Col. M. W. Rogers; *Treasurer*, T. C. Downing; *Secretary*, T. Archdale Pope, 57 Park Street, Calcutta, India.

Photographic Survey of Warwickshire.—Established 1890. Headquarters, Club Rooms, Colonnade Hotel, Birmingham. *President*, Sir J. Benj. Stone; *Vice-Presidents*, Jethro A. Cossins, W. Andrews, Jonathan Pratt; *Treasurer*, S. F. Lyndon, J.P.; *Secretary*, J. H. Pickard, Southfield, Priory Road, Edgbaston, Birmingham, England.

Plympton Camera Club.—Established 1894. *President*, Dr. Aldridge; *Council*, Messrs. Ellery, Pode and Fritton; *Secretary*, Edgar Dudley.

Polytechnic Photographic Society.—Established 1891. Headquarters, 309 Regent Street, London, W. Meetings, first and third Fridays in each month. *President*, Quintin Hogg; *Vice-Presidents*, W. E. Debenham, R. Mitchell; *Treasurer*, F. R. Tissington; *Secretary*, Albert B. Moss, 64 Wood Lane, London, W. England.

Postal Photographic Club.—Established 1890. *Secretary* and *Treasurer*, G. D. Nickels, 13 Vale Terrace, Lymington Road, Torquay, England.

Postal Photographic Competition Club.—Established 1893. *Treasurer* and *Secretary*, Hugo Meynell, Farley, Cheadle, Stoke-on-Trent, England.

Preston Camera Club.—Established 1891. Headquarters, Hell Gate, Fishergate. Annual meeting, March. Meetings, first Thursday in each month. *President*, Col. Oliver, J.P.; *Vice-Presidents*, John Healey, J.P., and M. B. Copland, J.P.; *Treasurer* and *Secretary*, Frank Kelton, Oak Cottage, Fulwood, Preston, Lancashire, England.

Pudsey District Photographic Society.—Established 1891. Headquarters, Mechanics' Institute. Annual meeting, January. *President*, Dr. W. L. Hunter; *Vice-Presidents*, J. Barrow and H. Crossley; *Secretary* and *Treasurer*, J. Goodman, Brunswick Road, Pudsey, Leeds, England.

Putney Photographic Society.—Established 1889. *President*, Baron Pollock; *Vice-Presidents*, H. Kimber, Dr. W. J. Sheppard; *Secretary* and *Treasurer*, Wm. Martin, Jr., 4 Lower Parkfields, Putney, S. W., London, England.

Ramsgate Camera Club.—Established 1894. Headquarters, Victoria Hotel, Hardres Street. Meetings fortnightly. *President*, G. R. Tweedie; *Vice-Presidents*, Rev. W. C. Bourne and W. T. Davey; *Secretaries* and *Treasurers*, Thos. J. Dutton and A. Vigor.

Reading Y. M. C. A. Camera Club.—Established 1894. Headquarters, Y. M. C. A., Valpy Street, Reading. Meetings, Thursday in each month. *Treasurer* and *Secretary*, Henry A. Churchill, Y. M. C. A., Valpy Street, Reading, England.

Redruth Amateur Photographic Club.—Annual meeting, April. *President*, Thurston C. Peter; *Secretary*, Ernest Beringer, Wheel Agar, Redruth.

Richmond Camera Club.—Established 1880. Headquarters, Greyhound Hotel, Surrey. Annual meeting, October. Meetings, Mondays in each month. *President*, F. P. Cembrans, Jr.; *Treasurer*, C. H. Davis; *Secretary*, P. Ennis, 28 Halford Road, Richmond, Surrey, England.

R. N. E. College Photographic Club.—Established 1891. Headquarters, R. N. E. College, Devonport. *President*, W. B. Hall, R.N.; *Vice-President*, P. Stocker; *Treasurer* and *Secretary*, F. J. Charlton, R. N. E. College, Devonport, England.

Rochdale and District Photographic Society.—Established 1890. Headquarters, Duckworth's Hotel, Drake Street, Rochdale. Meetings, second Monday in each month. *President*, J. A. Bright; *Vice-President*, J. R. Heape; *Treasurer*, J. H. Hoyle; *Secretaries*, Hermann and Wm. Bamford, 242 Yorkshire Street, Rochdale.

Rochester Naturalists' Club.—Established 1890. Headquarters, Mathematical School, Rochester. *President*, C. Berd; *Vice-President*, J. H. Whitfield; *Treasurer*, R. Lines; *Secretary*, J. L. Allen, Clover House, Chatham, England.

Rosendale Camera Club.—Established 1894. *Secretary*, T. H. Yardley, Rawenstall, Manchester, England.

Rotherham Photographic Society.—Established 1889. Headquarters, 9 Frederick Street. *President*, Dr. F. B. J. Baldwin; *Vice-Presidents*, E. I. Hubbard, W, H. Haywood, G. T. M. Rackstraw; *Treasurer*, James Leadbeater; *Secretary*, H. C. Hemmingway, 6 Stanley Street, Rotherham, England.

Royal College of Science Photographic Society.—Established 1888. Headquarters, Royal College of Science, London, S. W. Meetings, fortnightly. *President*, Capt. W. de W. Abney; *Vice-Presidents*, H. Chapman Jones and W. Kirman; *Treasurer* and *Secretary*, Chas. J. Makin, Royal College of Science, South Road, Kensington, London, S. W., England.

St. Bartholomew's Hospital Photographic Society.—Established 1890. Headquarters, St. Bartholomew's Hospital, London, E. C. Meetings by special call. *President*, Dr. W. J. Russell. *Vice-Presidents*, Dr. H. Lewis Jones and F. Womack; *Secretaries*, J. Hussey and M. G. Pearson,St. Bartholomew's Hospital, London, E. C., England.

Selby Camera Club.—Established 1891. Headquarters, Club Rooms, Park Street. Meetings, Thursdays during the winter months. *President*, W. Rawling; *Vice-Presidents*, J. T. Atkinson, J. C. Thompson; *Treasurer* and *Secretary*, W. N. Cheesman, The Crescent, Selby, England.

Settle Photographic and Lantern Society.—Established 1893. Headquarters, Adult School House, Settle. Meetings, Friday in each month. *President*, D. R. Smith; *Treasurer*, C. W. Buck; *Secretary*, H. Vaughn Walker, Settle, England.

Shaw Church Institute Photographic and Art Society.—Established 1888. Headquarters, Shaw Church Institute. Shaw, Oldham. Annual meeting, October. Meetings, first Friday in each month. *President*, J. H. Ashton; *Vice-President*, J. H. Broadbelt; *Treasurer* and *Secretary*, John Marden, 91 Rochdale Road, Shaw, Oldham, England.

Sheffield Camera Club.—Established 1888. Headquarters, New Surrey Street, Sheffield. Annual meeting, January. Meetings, fourth Wednesday in each month. *President*, B. W. Windir; *Vice-Presidents*, Dr. E. Skinner and Prof. J. O. Arnold; *Treasurer*, G E. Mabham; *Secretary*, Sparsham Camp, 55 Chesterfield Road, Meersbrook Bank, Sheffield, England.

Sheffield Optical Lantern Society.—Established 1890. Headquarters, St. Paul Schools, Cambridge Street. Annual meeting, February. *President*, E. G. Draper; *Vice-Presidents*, H. Stamforth, J. Clowes; *Secretary*, J. S. Stevens, 6 Sheaf Gardens Terrace, Sheffield, England.

SHEFFIELD PHOTOGRAPHIC SOCIETY.—Headquarters, Masonic Hall, Surrey Street. Annual meeting, October. Meetings, first Tuesday in each month. *President*, Ernest Beck; *Vice-Presidents*, Messrs. B. J. Taylor, Bradley, Newill, and George Bromley; *Treasurer*, W. M. Toplis; *Secretary*, Sparsham Camp, 272 Shoreham Street, Sheffield, England.

SHIELDS AND DISTRICT CAMERA CLUB.—Established 1893. Meetings, first and third Wednesdays in each month, from October to April. *President*, M. S. Corder; *Vice-Presidents*, F. Gray and T. A. Tait; *Treasurer*, W. S. Irvin; *Secretary*, A. Surtees, 14 Heylton Terrace, North Shields, England.

SHROPSHIRE CAMERA CLUB.—Established 1886. Headquarters, Castle Chambers, Shrewsbury. Meetings, second Tuesday in each month. *President*, Fred'k W. Williams; *Vice-Presidents*, M. J. Harding, G. Bidlake, W. W. Naunton and W. S. Buddicom; *Treasurer*, W. Burson; *Secretary*, Wallace Heath, Elmfield, Shrewsbury, England.

SIMPSON MEMORIAL PHOTOGRAPHIC SOCIETY.—Established 1890. Headquarters, Simpson Memorial Institute. Meetings, first Tuesday in each month. *President*, W. H. Tyas; *Vice-Presidents*, J. G. Sankey and J. B. Stockwell; *Treasurer* and *Secretary*, J. Edwards, 44 Herbert Street, Moston, Manchester, England.

SOUTH LONDON PHOTOGRAPHIC SOCIETY.—Established 1889. Annual meeting, April. *President*, F. W. Edwards; *Vice-Presidents*, S. W. Gardner, M. Howell, Dr. Munyard and W. Rice; *Treasurer*, Mark Boxall; *Curator*, G. H. Moss; *Lanternist*, J. T. French; *Secretary*, Chas. H. Oakden, 51 Melbourne Grove, East Dulwich, London, S. E., England.

SOUTH MANCHESTER PHOTOGRAPHIC AND LANTERN SOCIETY.—Established 1892. Headquarters, Langford Lecture Hall, Stretford. Annual meeting, September. Meetings, first Friday in each month. *Chairman*, J. W. Wade; *Treasurer*, E. N. Bowden; *Secretary*, Sawley Brown, Riverdale, Charlton-cum-Hardy, Manchester, England.

SOUTHPORT SOCIAL PHOTOGRAPHIC CLUB.—Established 1890. Headquarters, The Studio, 15 Cambridge Arcade. Annual meeting, October. Meetings, Wednesdays in each month. *President*, Holland J. Heaton; *Vice-Presidents*, C. F. Depree and J. C. Smith; *Secretary* and *Treasurer*, J. R. Care, 52 Nevill Street, Southport, England.

SOUTHSEA AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, 3 King's Road. Annual meeting, January. *President*, Dr. Lord; *Vice-President*, Major Wilkinson, R.E.; *Secretary*, Major Burns, H. M. Gun Wharf, Portsmouth, England.

SPA VALLEY PHOTOGRAPHIC SOCIETY.—Established 1890. Headquarters, Coffee Tavern, Cleckheaton. Meetings, second Tuesday in each month, *President*, Dr. Farrow; *Vice-Presidents*, Dr. Sutherland, Dr. J. Sykes and B. H. Goldthorp; *Treasurer* and *Secretary*, H. Jackson. 66 Westgate, Cleckheaton, Yorkshire, England.

STAFF COLLEGE PHOTOGRAPHIC CLUB.—Established 1889. Headquarters, Staff College, Camberley. *Treasurer* and *Secretary*, Capt. Montgomery, Staff College, Camberley, Surrey, England.

STAFFORDSHIRE POTTERIES AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1890. Headquarters, Town Hall, Burslem, Stoke-upon-Trent, England. Annual meeting, February. *President*, E. B. Wain; *Vice-Presidents*, J. F. Hewitt, A. Shorter and F. C. Powell; *Treasurer*, S. Gibson; *Secretary*, W. H. Walley.

STEREOSCOPIC CLUB.—Established 1890. Headquarters, Brooklands Hotel, near Manchester. Annual meeting, January. Meetings, last Monday in each month. *President*, Jas. Witely; *Secretary*, W. I. Chadwick, Brooklands, near Manchester, England.

ST. JOHN'S PHOTOGRAPHIC AND SCIENTIFIC SOCIETY.—Established 1893. Headquarters, Parish Room, Brooklands. Meetings, second Monday in each month. *President*, Rev. H. Bethell Jones; *Vice-President*, F. J. Simpson; *Treasurer*, J. G. Thompstone; *Secretary*, G. B. Jones, The Vicarage, Brooklands, Manchester, England.

STOCKPORT PHOTOGRAPHIC SOCIETY.—Established 1889. Headquarters, Mechanics' Institute. Annual meeting, September. Meetings, second Wednesday in each month, also the fourth Wednesday from November to February, inclusive. *President*, Thos. Kay; *Vice-Presidents*, Col. Turner, Alderman Harrison and W. B. Leigh; *Treasurer*, Thomas Bedford; *Secretary*, Thomas Gould, 104 Chestergate, Stockport, England.

STOCKTON PHOTOGRAPHIC SOCIETY.—Established 1887. Headquarters, Mason's Court, High Street. Annual meeting, January. Meetings, second Tuesday in each month. *President*, Wm. Downs; *Vice-Presidents*, H. Bradley and E. Bacon; *Treasurer*, J. H. Draper; *Secretary*, J. E. Ellam, Yarm, Yorkshire, England.

SUN AND COMPANY POSTAL PHOTOGRAPHIC CLUB.—Established 1886. *Council*, A. D. Guthrie, Wallace Heath, F. W. Williams and M. J. Harding; *Secretary*, M. J. Harding, Lexden Gardens, Shrewsbury, England.

SUNDERLAND PHOTOGRAPHIC ASSOCIATION.—Established 1888. *President*, W. Milburn; *Vice-Presidents*, J. Lynn and W. Pratt; *Treasurer*, I. Walton; *Secretary*, Chas. Cowper, Thornhill Gardens, Sunderland, England.

SUTTON COLDFIELD CAMERA CLUB.—Established 1889. Headquarters, Town Hall, Sutton Coldfield. Meetings, second and fourth Fridays in each month. *President*, Henry Duncalfe; *Treasurer*, T. S. Hooper; *Secretary*, C. J. Fowler, Court Mount, Erdington, near Birmingham, England.

SUTTON SCIENTIFIC SOCIETY (Photographic Section).—Established 1886. Headquarters, Scientific Society, Mulgrave Road, Sutton, Surrey. Meetings, second and fourth Tuesdays in each month. *President*, E. de Clifford; *Secretary*, A. P. Hoole, The Willows, Sutton, Surrey, England.

SWANSEA AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1888. Headquarters, Tenby Hotel, Walters' Road, Swansea. Annual meeting, January. Meetings, last Tuesday in each month. *President*, B. H. Morgan; *Vice-Presidents*, S. F. Thompson and William Terrill; *Treasurer* and *Secretary*, E. Ernest Morgan, Bryn Nant, Swansea, Wales.

TALBOT ALBUM CLUB.—Established 1886. *Secretary*, Fred H. Davies, 265 Coventry Road, Birmingham, England.

TOOTING CAMERA CLUB.—Established 1890. Headquarters, High Street, Tooting Graveney, Surrey. Annual meeting, March. Meeting, Thursdays in each month. *President*, A. H. Anderson; *Vice-President*, J. H. Beckett;

Treasurer, C. D. Erncourt Stowells; *Secretary*, T. H. Young, The Dell, Tooting Graveney, Surrey, England.

Toxteth Amateur Photographic Society.—Headquarters, 93 Park Lane, Liverpool. *President*, E. H. Maddock ; *Secretary*, A. Smedley.

Toynbee Camera Club.—Established 1888. Headquarters, Toynbee Hall, 28 Commercial Street, London, E. Annual meeting, May. Meetings, second Tuesday in each month. *President*, Rev. K. Jameson ; *Vice-Presidents*, F. E. Bartholomew, Dr. Fison and A. Price ; *Treasurer*, J. E. Monk ; *Secretaries*, A. E. Birch and T. W. Glare, 35 Heathland Road, Stoke Newington, England.

Trowbridge and District Photographic Society.—Established 1893. Headquarters, The Parade, Trowbridge. Meetings, second Thursday in each month. *Treasurer* and *Secretary*, R. H. Foley, The Halve, Trowbridge, England.

Tunbridge Wells Amateur Photographic Association.—Established 1887. Headquarters, Mechanics Institute. Annual meeting, January. *President*, F. G. Smart ; *Vice-Presidents*, Rev. A. T. Scott, E. R. Ashton and George Lewis ; *Treasurer*, B. Whitrow ; *Secretary*, Joseph Chamberlain, 14 Calverley Park Gardens, Tunbridge Wells, England ; *Auditor*, E. Catchpole.

Tyneside Camera Club.—Established 1891. Headquarters, Clarence Street Schools, Newcastle-on-Tyne. Annual meeting, September. Meetings, Mondays in each month. *President*, J. F. McKie ; *Vice-President*, W. Bell ; *Treasurer*, P. Simpson ; *Secretary*, T. O. Birkett, Clarence Street Schools, Newcastle-on-Tyne, England.

Ulster Amateur Photographic Society.—Established 1886. Headquarters Belfast. Annual meeting, January. *President*, Wm. Swanston, F. G. S.; *Vice-Presidents*, John Brown and E. Braddell; *Treasurer*, R. E. Workman; *Secretary*, D. Cecil Shaw, 14 College Square, East, Belfast, Ireland.

University College Photographic Society.—Established 1889. Headquarters, University College, Gower Street, London, W. C. Meetings, second Tuesday in each month during college session. *President*, Dr. R. J. Plumpton; *Treasurer*, J. R. Stratford Fox; *Secretary*, G. Muir Foster, 18 Daleham Gardens, Hampstead, N. W., England.

Upper Holloway Cycling Club. (Camera Division).—Established 1892. Headquarters, Royal Oak Hotel. Upper Holloway. Meetings, first Thursday in each month. *President*, F. W. Trew; *Vice-Presidents*, J. S. Cross and F. Dean; *Treasurer* and *Secretary*, F. W. Timms, 5 Abercorn Terrace, Upper Holloway, London, N., England.

Uttoxeter Photographic Society.—Established 1891. Headquarters, Cedar Street. Annual meeting, April. Meetings, first Wednesday in each month. *President*, Rev. C. F. Barnwell; *Vice-Presidents*, H. Meynell, C. W. Lyon and F. A. Bolton; *Treasurer*, A. T. Hardy; *Secretary*, Alfred Parker, High Street, Uttoxeter, Staffordshire, England.

Wakefield Photographic Society.—Established 1890. Headquarters, Cocoa Tavern. Annual meeting, October. Meetings, once a month. *President*, Capt. Norwood; *Vice-Presidents*, A. W. Stawfield and Rev. A. Addison; *Treasurer*, H. R. Faigh; *Secretary*, W. Wrigley, Wakefield, England.

WALSALL AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, Y. M. C. A. Rooms, Freer Street. Meetings, second and fourth Thursday in each month. *President*, Frederick Brown; *Treasurer* and *Secretary*, E. A. Day, 1 St. Paul's Terrace, Walsall, England,

WALTON PHOTOGRAPHIC SOCIETY. Established 1889. Headquarters, Arnot Street Schools. Annual meeting, February. Meetings, first Wednesday in each month. *President*, Jno. Parker; *Treasurer* and *Secretary*, T. Bickerstaff, 121 Makin Street, Walton, Liverpool, England.

WARRINGTON AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1886. Annual meeting, January. *Council*, C. Aylward, J. W. Cavanagh, P. Dalton, T. J. Down, J. Fairhurst, J. Hallows, J. Harding, T. Hesketh, H. N. Houghton, G. Kirby, F. Pearson, H. Pritchard, J. Skelton and T. Welsby.

WATERLOO (Liverpool), SOCIAL CAMERA CLUB.—Annual meeting, July. *President*, E. Rawlins; *Treasurer*, J. C. Matthews; *Competition Manager*, W. O. Muir; *Secretary*, C. W. Budden, 7 Cambridge Road, Waterloo, Liverpool, England.

WEST KENT AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Railway Hotel, Bexley. Annual meeting, October: Meetings, alternate Mondays. *President*, Andrew Pringle; *Vice-President*, A. R. Dresser; *Treasurer*, Gregor Grant; *Secretary*, Edw. Hawkins, Manor Estate, Sidcup, Kent, England.

WEST LONDON PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Chiswich School of Arts and Crafts, Bedford Park. Meetings, Tuesdays in each month. *President*, J. A. Hodges; *Treasurer*, W. H. Whitear; *Secretary*, W. S. Rogers, 13 Addison Road, Chiswich, London, W., England.

WEST SURREY PHOTOGRAPHIC SOCIETY.—Established 1887. Headquarters, Public Library, Lavender Hills, S. W. Meetings, alternate Wednesdays. *President*, Col. J. Gale; *Treasurer* and *Secretary*, G. H. Seward, Public Library, Lavender Hill, S. W., England.

WIDNES PHOTOGRAPHIC SOCIETY.—Established 1893. Headquarters, Bedford Chambers, Victoria Road. Meetings, alternate Wednesdays. *President*, V. C. Driffield; *Vice-President*, G. J. Warner; *Treasurer*, T. Cosier; *Secretary*, Geo. Ray, Bold, near Widnes, England.

WIGAN PHOTOGRAPHIC SOCIETY.—Established 1889. Headquarters, Y. M. C. A. Rooms, Rodney Street. Annual meeting, September. Meetings, alternate Thursdays in each month. *President*, J. A. Lowe; *Vice-Presidents*, Rev. J. S. Barnes, R. Wardman, G. R. Newman; *Treasurer* and *Secretary*, Fred Betley, 10 Ashland Avenue, Wigan, England.

WOLVERHAMPTON PHOTOGRAPHIC SOCIETY.—Established 1888. Headquarters, Blind Institute, Victoria Street. Meetings, first Tuesday and third Wednesday in each month. *President*, J. Stokes; *Vice-President*, J. Gale; *Treasurer*, T. G. Gibson; *Secretary*, S. R. Rhodes, 53 Queen Street, Wolverhampton, England.

WOOLWICH PHOTOGRAPHIC SOCIETY.—Established 1892. Headquarters, St. John's Schools, Wellington Street, Woolwich. Meetings, second and fourth Thursdays in each month. *President*, Rev. S. E. Chettoe; *Vice-President*, Col.

C. D. Davies: *Treasurer*, H. H. Barker; *Secretary*, J. Borthwick Panting, 3 Friars Villas, Old Charlton, Woolwich, England.

Worcester Tricycle Club (Camera Section).—Established 1892. Headquarters, Bell Hotel, Worcester. Meetings, Thursdays in each month. *President*, James Wilkes; *Treasurer*, F. E. Hill; *Secretary*, T. J. Hobson, Laurel Villa, Boughton Street, St. John's, Worcester, England.

Wycombe District Amateur Photographic Society.—Established 1892. Headquarters, South Bucks Auction Mart. Meetings, first Monday in each month. *President*, L. Broughton; *Treasurer* and *Secretary*, J. Wilford, 7 High Street, High Wycombe, England.

York Photographic Society.—Established 1887. Headquarters, Victoria Hall. Annual meeting, October. Meetings, first Wednesday in each month. *President*, H. C. Swailes, L.R.C.P., L.R.C.S.; *Vice-President*, J. Saville, M.P.S.; *Treasurer*, R. Bainbridge; *Lanternist*, J. Dickinson; *Secretary*, F. G. Benson, 50 Scott Street, York, England.

Yorkshire Philosophical Society.—Established 1888. Headquarters, the Museum, York. Annual meeting, October. Meetings, first Wednesday in each month. *President*, Tempest Anderson ; *Vice-Presidents*, W. Monkhouse and J. N. Kitching; *Treasurer* and *Secretary*, H. Dennis Taylor, 20 Bootham Terrace, York, England.

FRANCE.

Le Photo-Velo-Club de Paris.—M. Violette, 21 Boulevard St. Germain, Paris, France.

Photo Club de Constantine.—*President*, M. Pouill; *Vice-President*, M. Labiteau; *Treasurer*, M. Rech; *Secretary*, M. Amat.

Photo Club Regional de Lyon et du Sud-Est.—*Secretary*, M. Paul Boisard.

Photo Club Rouennais.—*President*, M. Abel Buguet; *Secretary*, M. L. Chesneau.

Societe des Amateurs Photographes (Paris).—*President*, M. Niewenglowski; *Secretary*, M. Maxime Brault.

Societe Francaise de Photographie.—*President*, M. Davanne; *Vice-President*, M. Bardy; *Secretary*, M. Perrot de Chaumeux.

Societe d'Etudes Photographiques. (Paris.)—*President*, M. Batagny; *Secretary*, A. Villam.

Societe Photo-Artistique Montpellier.

Societe Lorraine de Photographic Nancy.—*President*, M. Riston.

Societe Nogentaise de Photographie.—*President*, M. Litton.

Societe Photographique de la Savoie (Chambery).—*President*, M. Courtois; *Vice-President*, M. des Frams; *Treasurer*, M. Abriond; *Secretary*, M. F. Dollin.

Societe Photographique de Reunes.—*President*, M. Georges Fontaine; *Secretary*, M. G. Marnelle.

Societe Photographique du nord de la France.

Societe Versaillaise de Photographie.—*President*, M. Buequet; *Secretary*, M. R. Jessé Curély.

Union Nationale des Societes Photographiques de France.—*President*, M. J. Janssen.

Union Photographique Remoise.—Established 1894. *President*, M. Scheibel; *Vice-President*, G. Clement; *Treasurer*, E. Allart; *Secretary*, P. Carrier.

BELGIUM.

Association Belge de Photographie.—*President*, Jos. Maes, 33, Rue Rembrandt Anvers; *Vice-Presidents*, A. de Blochouse and Massauye de Louvreux; *Treasurer*, E. Moulin; *Secretary*, Ch. Puttemans, Rue de Moulin, 59, St. Josse-ten-Noode, Bruselles, Belgium.

Section d'Anvers.—*President*, Jos. Maes; *Secretary*, L. Stappers.

Section de Bruxelles.—*President*, A. Rutot; *Secretary*, E. Stadeler.

Section de Gand.—*President*, M. De Vylder; *Secretary*, A. Goderus.

Section de Liege.—*President*, M. O. Loiseau; *Secretary*, M. Detaille.

Section de Namur.—*President*, Ed. Jossart; *Secretary*, Erie Gilson.

Association Nationale des Photographes Amateurs.—*President*, M. A. Savary, 5 à Châteaugiron, Ille-et-Villamé.

AUSTRALIA.

Gordon College Amateur Photographic Association.—Headquarters, Gordon College, Geelong, Australia. Meetings on the second and fourth Fridays of each month. *President*, H. G. Roebuck; *Vice-Presidents*, R. C. Hocking, J. B. Leitch; *Treasurer*, A. Purnell; *Secretary*, J. Hammerton, Jr., 73 Little Ryrie, Street, Geelong, Australia.

South Australian Photographic Society.—Founded 1885. *President*, C. F. Clough, Assoc. M. Inst., C. E.; *Vice-President*, E. W. Belcher; *Hon. Secretary*, A. H. Kingsborough, Childers Street, North Adelaide; *Hon. Treasurer*, R. B. Adamson; *Hon. Librarian*, J. D. Dixon.

TABLES.

TABLE OF THE ELEMENTS:

THEIR SYMBOLS, ATOMIC WEIGHTS, AND EQUIVALENTS.

	Symbol.	Atomic Weight.	Equivalent.		Symbol.	Atomic Weight.	Equivalent.
Aluminium	Al	27.02	9.007	Mercury	Hg	199.8	99.9
Antimony	Sb	120.	40.	Molybdenum	Mo	95.8	19.16
Arsenic	As	74.9	24.97	Nickel	Ni	58.6	29.3
Barium	Ba	136.8	68.4	Niobium	Nb	94.	31.33
Beryllium	Be	9.08	4.54	Nitrogen	N	14.01	4.67
Bismuth	Bi	208.	69.33	Osmium	Os	193.	24.125
Boron	B	10.9	3.66	Oxygen	O	15.96	7.98
Bromine	Br	79.75	79.75	Palladium	Pd	106.2	26.55
Cadmium	Cd	112.	56.	Phosphorus	P	30.96	10.32
Cæsium	Cs	133.	132.7	Platinum	Pt	194.3	48.575
Calcium	Ca	39.9	19.95	Potassium	K	39.04	39.04
Carbon	C	11.97	2.99	Rhodium	Ro	104.	26.
Cerium	Ce	139.9	46.6	Rubidium	Rb	85.2	85.2
Chlorine	Cl	35.37	35.37	Ruthenium	Ru	104.4	26.1
Chromium	Cr	52.4	26.2	Selenium	Se	78.8	39.4
Cobalt	Co	59.	29.5	Silicon	Si	28.3	7.
Copper	Cu	63.2	31.6	Silver	Ag	107.66	107.66
Didymium	Di	143.0	47.8	Sodium	Na	23.	23.
Erbium	E	165.9	55.3	Strontium	Sr	87.3	43.65
Fluorine	F	19.1	19.1	Sulphur	S	31.98	15.99
Gallium	Ga	69.	23.	Tantalum	Ta	182.	60.67
Gold	Au	197.	65.66	Tellurium	Te	125.	62.5
Hydrogen	H	1.	1.	Thallium	Tl	203.64	203.64
Indium	In	113.4	37.8	Thorium	Th	231.87	57.97
Iodine	I	126.53	126.53	Tin	Sn	117.8	58.9
Iridium	Ir	192.5	48.125	Titanium	Ti	48.0	12.
Iron	Fe	55.9	27.95	Tungsten	W	183.6	30.6
Lanthanum	La	138.5	46.17	Uranium	U	240.	60.
Lead	Pb	206.4	103.2	Vanadium	V	51.2	17.07
Lithium	Li	7.01	7.01	Yttrium	Y	89.6	29.87
Magnesium	Mg	24.	12.	Zinc	Zn	65.2	32.6
Manganese	Mn	55.	27.5	Zirconium	Zr	90.	45.

NOTE.—The equivalent numbers are the smallest quantities of the element that unite with one part of hydrogen, eight parts of oxygen, or thirty-five parts of chlorine.

SOLUBILITY OF CHLORIDE OF SILVER IN SOLUTIONS OF VARIOUS SALTS.

(*H. Hahn.*)

	Per Cent. of the Solution.	Saturated at	Per Cent. of Silver Chloride Dissolved.	Per Cent. of Silver.	Sp. Gr.	Temperature.	Number of Grams of Silver in 100 c. c.
Potassium chloride	24.95	19.6°	0.0776	0.0584	1.1774	19.6°	0.0688
Sodium "	25.96	"	0.1053	0.0793	1.2053	"	0.0956
Ammonium "	28.45	24.5°	0.3397	0.2551	1.0835	30.0°	0 2764
Calcium "	41.26	"	0.5713	4.4300	1.4612	"	0.6283
Magnesium "	36.35	"	0.5313	0.3999	1.3350	"	0.5339
Barium "	27.32	"	0.0570	0.0429	1.3017	"	0.0558
Ferrous "	30.70	—	0.1686	0.1269	1.4199	20.0°	0.1802
Ferric "	37.48	—	0.0058	0.0044	1.4472	21.4°	0.0064
Manganous "	43.85	24.5°	0.1996	0.1499	1.4851	20.0°	0.2226
Zinc "	53.34	—	0.0134	0.0101	1.6005	"	0.0162
Cuprous "	44.48	24.5°	0.0532	0.0399	1.5726	"	0.0627
Lead "	0.99	"	0.0000	0.0000	1.0094	"	0.0000

SOLUBILITY OF SILVER CHLORIDE IN SOLUTIONS OF SODIUM SULPHITE OF VARIOUS DEGREES OF CONCENTRATION.

(*W. de W. Abney.*)

Strength of Sodium Sulphite Solution.	Grams of Silver Chloride Dissolved per 100 c. c.
1.04 grams per 100 c. c. of water.	0.007
2.08 " " " "	0.020
4.16 " " " "	0.070
6.24 " " " "	0.110
8.35 " " " "	0.150
16.70 " " " "	0.310
20.83 " " " "	0.400

SOLUBILITY OF SILVER CHLORIDE IN SOLUTIONS OF SODIUM THIOSULPHATE OF VARIOUS DEGREES OF CONCENTRATION.

(*W. de W. Abney.*)

Strength of Sodium Thiosulphate Solution.	Grams of Silver Chloride Dissolved per 100 c. c.
2.08 grams per 100 c. c. of water.	0.29
4.16 " " " "	0.64
6.24 " " " "	0.88
8.35 " " " "	1.26
16.70 " " " "	2.54
20.83 " " " "	3.28

DENSITIES OF WATER SOLUTIONS OF ALBUMEN AT 15.5° CELSIUS.

(*Eder's Year Book of Photography.*)

Per Cent. Albumen.	° Bé.	Sp. Gr.	Per Cent. Albumen.	° Bé.	Sp. Gr.	Per Cent. Albumen.	° Bé.	Sp. Gr.
1	0.37	1.0026	15	5.32	1.0384	40	13.78	1.1058
2	0.77	1.0054	20	7.06	1 0515	45	15.48	1.1204
3	1.12	1.0078	25	8.72	1.0644	50	17.16	1.1352
5	1.85	1.0130	30	10.42	1.0780	55	18.90	1.1511
10	3.66	1.0261	35	12.12	1.0919			

DENSITIES OF VARIOUS MIXTURES OF ALCOHOL AND ETHER AT 15° CELSIUS.

(*Eder's Year Book of Photography.*)

Per Cent. Alcohol 0.809 Sp. Gr.	Sp. Gr.	Per Cent. Alcohol 0.809 Sp. Gr.	Sp. Gr.
0	0.729	60	0.779
10	0.737	70	0.786
20	0.747	80	0.798
30	0.756	90	0.801
40	0.765	100	0.809
50	0.772		

DENSITIES OF WATER SOLUTIONS OF CUPRIC CHLORIDE AT 17.5° CELSIUS.

(*Franz.*)

Sp. Gr.	Per Cent. $Cu\ Cl_2$.	Sp. Gr.	Per Cent. $Cu\ Cl_2$.	Sp. Gr.	Per. Cent. $Cu\ Cl_2$.
1.0182	2	1.1696	16	1.3618	30
1.0364	4	1.1958	18	1.3950	32
1.0548	6	1.2223	20	1.4287	34
1.0734	8	1.2501	22	1.4615	36
1.0920	10	1.2779	24	1.4949	38
1.0178	12	1.3058	26	1.5284	40
1.1436	14	1.3338	28		

DENSITIES OF WATER SOLUTIONS OF FERRIC CHLORIDE AT 17.5° CELSIUS.

(*Franz.*)

Sp. Gr.	Per Cent. Fe_2Cl_6.	Sp. Gr.	Per Cent. Fe_2Cl_6.	Sp. Gr.	Per Cent. Fe_2Cl_6.
1.0146	2	1.1746	22	1.3870	42
1.0292	4	1.1950	24	1.4118	44
1.0439	6	1.2155	26	1.4367	46
1.0587	8	1.2365	28	1.4617	48
1.0734	10	1.2568	30	1.4867	50
1.0894	12	1.2778	32	1.5153	52
1.1054	14	1.2988	34	1.5439	54
1.1215	16	1.3199	36	1.5729	56
1.1378	18	1.3411	38	1.6023	58
1.1542	20	1.3622	40	1.6317	60

DENSITIES OF WATER SOLUTIONS OF SILVER NITRATE AT 16° CELSIUS.

(*Dawson.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $AgNO_3$.
4	2.7	1.021	2.08	19	12.4	1.097	10.41	34	20.9	1.172	18.75
8	5.4	1.040	4.16	23	14.9	1.116	12.50	38	23.0	1.191	20.83
12	8.0	1.059	6.24	27	17.1	1.135	14.58	42	25.0	1.209	22.91
16	10.6	1.078	8.35	30	18.8	1.152	16.66	45	26.4	1.227	25.00

DENSITIES OF WATER SOLUTIONS OF CHROME ALUM.

(*Franz.*)

Sp. Gr.	Per Cent.	Sp. Gr.	Per Cent.
1.0174	5	1.1896	40
1.0342	10	1.2894	50
1.0746	20	1.4566	60
1.1274	30	1.6362	70

DENSITIES OF WATER SOLUTIONS OF POTASH OR AMMONIA ALUM AT 17.5° CELSIUS.

(*Eder's Year Book of Photography.*)

Sp. Gr. of $K_2Al_2(SO_4)_4+24Aq$. Solution.	Sp. Gr. of $(NH_4)_2Al_2(SO_4)_4+24Aq$. Solution.	Per Cent.
1.0065	1.0060	1
1.0110	1.0109	2
1.0166	1.0156	3
1.0218	1.0200	4
1.0269	1.0255	5
1.0320	1.0305	6

DENSITIES OF WATER SOLUTIONS OF SULPHUROUS ACID AT 15° CELSIUS.

(*Scott.*)

Sp. Gr.	Per Cent. SO_2.	Sp. Gr.	Per Cent. SO_2.
1.0028	0.5	1.0302	5.5
1.0056	1.0	1.0328	6.0
1.0085	1.5	1.0353	6.5
1.0113	2.0	1.0377	7.0
1.0141	2.5	1.0401	7.5
1.0168	3.0	1.0426	8.0
1.0194	3.5	1.0450	8.5
1.0221	4.0	1.0474	9.0
1.0248	4.5	1.0497	9.5
1.0275	5.0	1.0520	10.0

DENSITIES OF WATER SOLUTIONS OF SODIUM HYDRATE AT 15° CELSIUS.

(*Eder's Year Book of Photography.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. NaOH.	°Tw.	°Bé	Sp. Gr.	Per Cent. NaOH.
2	1.4	1.012	1	34	20.9	1.170	15
5	3.4	1.023	2	45	26.4	1.225	20
7	4.7	1.035	3	56	31.5	1.279	25
9	6.0	1.046	4	66	35.8	1.332	30
12	8.0	1.059	5	77	40.1	1.384	35
14	9.4	1.070	6	87	43.8	1.437	40
16	10.6	1.081	7	98	47.4	1.488	45
18	11.9	1.092	8	108	50.6	1.540	50
21	13.6	1.103	9	118	53.6	1.591	55
23	14.9	1.115	10	129	56.6	1.643	60

DENSITIES OF WATER SOLUTIONS OF SODIUM THIOSULPHATE AT 20° CELSIUS.

(*Schiff.*)

°Tw.	°Bé.	Sp. Gr.	Per Cent. $Na_2S_2O_3+5Aq$.	Per Cent. $Na_2S_2O_3$.	°Tw.	°Bé.	Sp. Gr.	Per Cent. $Na_2S_2O_3+5Aq$.	Per Cent. $Na_2S_2O_3$.
5	3.4	1.0264	5	3.185	33	20.3	1.1676	30	19.113
11	7.4	1.0529	10	6.371	40	24.0	1.1986	35	22.298
16	10.6	1.0807	15	9.556	46	26.9	1.2297	40	25.484
22	14.2	1.1087	20	12.742	52	29.7	1.2624	45	28.669
28	17.7	1.1381	25	15.927	59	32.8	1.2954	50	31.855

DENSITIES OF WATER SOLUTIONS OF CERTAIN ALKALINE BROMIDES AT 20° CELSIUS.

(*Gerlach.*)

Per. Cent.	Potassium Bromide.	Lithium Bromide.	Sodium Bromide.	Barium Bromide.	Calcium Bromide.	Strontium Bromide.	Magnesium Bromide.
5	1.037	1.035	1.040	1.045	1.044	1.046	1.043
10	1.075	1.072	1.080	1.092	1.089	1.094	1.087
15	1.116	1.113	1.125	1.144	1.139	1.146	1.137
20	1.159	1.156	1.174	1.201	1.194	1.204	1.191
25	1.207	1.204	1.226	1.262	1.252	1.266	1.247
30	1.256	1.254	1.281	1.329	1.315	1.332	1.310
35	1.309	1.309	1.344	1.405	1.385	1.410	1.377
40	1.366	1.368	1.410	1.485	1.461	1.492	1.451
45	1.430	1.432	1.483	1.580	1.549	1.590	1.535
50		1 500	1.565	1.685	1.641	1.694	1.625
55		1.580		1.800			

DENSITIES OF WATER SOLUTIONS OF CERTAIN ALKALINE IODIDES AT 20° CELSIUS.

(*Gerlach.*)

Per Cent.	Potassium Iodide.	Lithium Iodide.	Sodium Iodide.	Barium Iodide.	Calcium Iodide.	Strontium Iodide.	Magnesium Iodide.
5	1.038	1.038	1.040	1.045	1.044	1.045	1.043
10	1.078	1.079	1.082	1.091	1.090	1.091	1.088
15	1.120	1.124	1.128	1.143	1.140	1.142	1.139
20	1.166	1.172	1.179	1.201	1.198	1.200	1.194
25	1.218	1.224	1.234	1.265	1.260	1.262	1.254
30	1.271	1 280	1.294	1.333	1.321	1.330	1.320
35	1.331	1.344	1.360	1.412	1.398	1.410	1.395
40	1.396	1.414	1.432	1.495	1.477	1.491	1.474
45	1.469	1.489	1.510	1.596	1.567	1.590	1.553
50	1.546	1.575	1.600	1.704	1.665	1.695	1.688
55	1.636	1.670	1.700	1.825	1.780	1.812	1.780
60	1.734	1.777	1.810	1.970	1.910	1.955	1.915
65						2.150	

DENSITIES OF WATER SOLUTIONS OF SODIUM CHLORIDE AT 20° CELSIUS.

(*Schiff.*)

Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.	Per Cent.	°Tw.	°Bé.	Sp. Gr.
1	1	0.7	1.0066	7	10	6.7	1.0483	13	19	12.4	1.0934	19	28	17.7	1.1408	25	38	23.0	1.1906
2	3	2.1	1.0133	8	11	7.4	1.0556	14	20	13.0	1.1012	20	30	18.8	1.1490	26	40	24.0	1.1990
3	4	2.7	1.0201	9	13	8.7	1.0630	15	22	14.2	1.1090	21	31	19.3	1.1572	27	41	24.5	1.2075
4	5	3.4	1.0270	10	14	9.4	1.0705	16	23	14.9	1.1168	22	33	20.3	1.1655	--	--	-- -	-- ---
5	7	4.7	1.0340	11	16	10.6	1.0781	17	25	16.0	1.1247	23	35	21.4	1.1738	--	--	-- -	-- ---
6	8	5.4	1.0411	12	17	11.2	1.0857	18	27	17.1	1.1327	24	36	22.0	1.1822	--	--	-- -	-- ---

DENSITIES OF WATER SOLUTIONS OF AMMONIA AT 14° CELSIUS.

(*Carius.*)

Specific Gravity.	Percentage of Ammonia.	Specific Gravity.	Percentage of Ammonia.
0.8844	36.0	0.9314	18.0
0.8864	35.0	0.9347	17.0
0.8885	34,0	0.9380	16.0
0.8907	33.0	0.9414	15.0
0.8929	32.0	0.9449	14.0
0.8953	31.0	0.9484	13.0
0.8976	30.0	0.9520	12.0
0.9001	29.0	0.9556	11.0
0.9026	28.0	0.9593	10.0
0.9052	27.0	0.9631	9.0
0.9078	26.0	0.9670	8.0
0.9106	25.0	0.9709	7.0
0.9133	24.0	0.9749	6.0
0.9162	23.0	0.9790	5.0
0.9191	22.0	0.9831	4.0
0.9221	21.0	0.9873	3.0
0.9251	20.0	0.9915	2.0
0.9283	19.0	0.9959	1.0

DENSITIES OF SODIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Schiff in *Chemiker Kalender*. Temperature 23° C. (73° F.). The gallon is that of the United States, and contains 133.28 ounces of water. The ounce contains 437.5 grains. The first four columns give percentage by weight and weight in 100 volumes of the crystals (10 molecules water) and dry salt respectively.

Grams of Crystals in 100 grms.	Grams of Crystals in 100 c. c.	Grams of Dry Salt in 100 grms.	Grams of Dry Salt in 100 c. c.	Ounces Crystals in one gallon.	Grains Crystals in one fluid ounce.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
50	60.2	18.53	22.31	80	262.5	1.204	24	40
45	53.2	16.67	19.75	71	232.	1.183	23	38
40	46.5	14.82	17.30	62	203.	1.162	20	32
35	40.0	12.97	14.83	53	174.5	1.141	18	28
30	33.6	11.12	12.32	45	147.	1.120	16	24
25	27.5	9.26	10.23	37	110.	1.099	13	20
20	21.6	7.41	8.00	29	94.5	1.079	10.5	16
15	15.9	5.56	5.83	21	69.5	1.059	8	12
10	10.4	3.70	3.85	14	45.5	1.039	5.4	8
5	5.1	1.85	1.86	7	22.3	1.019	2.7	4
2	2.0	.74	.76	3	8.8	1.008	1	1.4

DENSITIES OF POTASSIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Gerlach in *Chemiker Kalender.* Temperature 15° C. (60° F.). The gallon is that of the United States, and contains 133.28 ounces of water. The ounce contains 437.5 grains. Dry potassium carbonate is understood in the figures given, and the first two columns give percentages by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
52	81.6	109.	357	1.570	53	114
50	77.2	103.	338	1.544	51	108
45	66.6	89.	291	1.480	47	96
40	56.7	76.	248	1.419	43	84
35	47.5	63.	208	1.359	38	72
30	39.0	52.	171	1.301	33	58
25	31.1	41.5	137	1.246	29	51
20	23.8	32.	105	1.193	24	40
15	17.1	23.	75	1.142	18	28
10	10.9	14.5	44	1.093	12	18
5	5.2	7.	23	1.046	7	10
2	2.0	2.7	9	1.018	2.5	3

DENSITIES OF SATURATED SOLUTIONS.

The following solutions are saturated at 60° F. and the table gives the specific gravity, degrees Beaume and Twaddell, and the percentage of salt *by weight.*

	Specific Gravity.	Degree Beaume.	Degree Twaddell.	Percentage of Salt by Weight.
Alum (Ammonia) Crystallized	1.048	7	10	11
Potassium Carbonate Dry	1.571	52	112	52
" Oxalate	1.262	30	52	25
Sodium Carbonate (10 molecules water)	1.199	24	40	49
" Hyposulphite (5 " ")	1.210	25	41	58
" Sulphite (7 " ")	1.197	24	40	35

DENSITIES OF SODIUM SULPHITE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon experiments made specially for the construction of this table, temperature 15° C. (60° F.). The gallon is that of the United States, and contains 133.28 ounces of water; the ounce contains 437.5 grains of water. Crystallized sodium sulphite with seven molecules of water is understood in the figures given, and the first two columns give percentage by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
35.1	42.0	54.2	184	1.1969	24	40
30	35.0	46.6	153	1.1675	21	34
25	28.5	38.0	122	1.1381	17	27
20	22.2	29.6	97	1.1087	11	17
15	16.2	21.6	61	1.0793	10.5	15
10	10.5	14.0	46	1.0499	7.0	10
5	5.1	6.8	22.3	1.0205	3.0	4
2	2.0	2.7	8.8	1.0100	2.0	2

DENSITIES OF HOT SOLUTIONS FOR OBTAINING CRYSTALS OF THE FOLLOWING SUBSTANCES ON COOLING.

Substance.	°Bé.	Substanee.	°Be.
Acetate of Lead	42	Chloride of Calcium	40
" " Sodium	22	" " Copper	45
Oxalic Acid	12	" " Magnesium	35
Ammonia Alum	20	" " Potassium	25
Potash "	20	Bichromate of Ammonia	28
Nitrate of Lead	50	" " Potash	38
" " Potash	28	Chromate of Sodium	45
" " Soda	40	Hyposulphite of Sodium	3
Barium Hydrate	12	Iodide of Potassium	60
Borax	24	Oxalate of "	30
Bromide of Ammonium	30	Permanganate of Potassium	25
" " Cadmium	65	Phosphate of Soda	20
" " Potassium	40	Sulphate of Copper	30
" " Sodium	55	" " Iron (Copperas)	31
" " Strontium	50	" " Zinc	45
Carbonate of Sodium	28	Sulphite of Soda	25
Chlorate of Potash	22	Sulphocyanide of Ammonia	18
" " Sodium	43	Neutral Tartrate of Potash	38
Chloride of Ammonium	12	Rochelle Salts	36
" " Barium	35		

EQUIVALENT WEIGHTS OF CERTAIN SILVER COMPOUNDS, ETC.

By A. H. Elliott, Ph.D.

One part of silver, or one part of silver nitrate, is equal to the following parts of other combinations:

	Silver Chloride.	Silver Bromide.	Silver Iodide.	Potassium Chloride.	Potassium Bromide.
Silver	1.328	1.740	2.176	.690	1.102
Silver Nitrate.	.844	1.106	1.382	.439	.701

	Potassium Iodide.	Sodium Chloride.	Sodium Bromide.	Sodium Iodide.	Ammonium Chloride.
Silver	1.538	.541	.953	1.388	.495
Silver Nitrate	.971	.344	.606	.882	.315

	Ammonium Bromide.	Ammonium Iodide.	Cadmium Chloride.	Cadmium Bromide.	Cadmium Iodide.
Silver	.907	1.342	1.363	1.776	2.211
Silver Nitrate.	.576	.853	.538	.800	1.076

EQUIVALENT WEIGHTS OF CERTAIN GOLD COMPOUNDS.

(*Eder's Year Book of Photography.*)

Gold.	Gold Chloride (Anhyd.)	Gold Chloride (Crystallized.)	Double Chloride of Gold and Potassium.	Double Chloride of Gold and Sodium.	Double Chloride of Gold and Calcium.	Fizeau's Salt.
1	1.540	1.814	2.148	2.020	2.096	2.670
0.649	1	1.178	1.394	1.310	1.360	1.700
0.554	0.849	1	1.183	1.113	1.155	1.471
0.465	0.717	0.844	1	0.941	0.976	1.219
0.494	0.762	0.898	1.062	1	1.037	1.321
0.477	0.735	0.869	1.024	1.963	1	1.273
0.374	0.575	0.679	0.804	0.757	0.781	1

ACETIC ACID.

Quantities of crystallizable acid in mixtures of acetic acid and water of various densities at 15° C.

Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.
100	1.0553	75	1.0746	50	1.0615	25	1.0350
99	1.0580	74	1.0744	49	1.0607	24	1.0337
98	1.0604	73	1.0742	48	1.0598	23	1.0324
97	1.0625	72	1.0740	47	1.0589	22	1.0311
96	1.0644	71	1.0737	46	1.0580	21	1.0298
95	1.0660	70	1.0733	45	1.0571	20	1.0284
94	1.0674	69	1.0729	44	1.0562	19	1.0270
93	1.0686	68	1.0725	43	1.0552	18	1.0256
92	1.0696	67	1.0721	42	1.0543	17	1.0242
91	1.0705	66	1.0717	41	1.0533	16	1.0228
90	1.0713	65	1.0712	40	1.0523	15	1.0214
89	1.0720	64	1.0707	39	1.0513	14	1.0201
88	1.0726	63	1.0702	38	1.0502	13	1.0185
87	1.0731	62	1.0697	37	1.0492	12	1.0171
86	1.0736	61	1.0691	36	1.0481	11	1.0157
85	1.0739	60	1.0685	35	1.0470	10	1.0142
84	1.0742	59	1.0679	34	1.0459	9	1.0127
83	1.0744	58	1.0673	33	1.0447	8	1.0113
82	1.0746	57	1.0666	32	1.0436	7	1.0098
81	1.0747	56	1.0660	31	1.0424	6	1.0083
80	1.0748	55	1.0653	30	1.0412	5	1.0067
79	1.0748	54	1.0646	29	1.0400	4	1.0052
78	1.0748	53	1.0638	28	1.0388	3	1.0037
77	1.0748	52	1.0631	27	1.0375	2	1.0022
76	1.0747	51	1.0628	26	1.0363	1	1.0007

N. B.—The density of the mixture increases until nearly 25 % of water is present, after which it again decreases. Acetic acid is, therefore, better tested volumetrically with a standard solution of alkali.

SULPHUROUS ACID.

Quantities of anhydrous sulphurous acid in solutions of different densities.

(*F. Authon.*)

Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.
1.046	9.54	1.027	6.68	1.020	4.77	1.013	2.86
1.036	8.59	1.023	5.72	1.016	3.82	1.009	1.90
1.031	7.63					1.005	0.95

ALCOHOL.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s. g. .7932) and Water, by Weight and by Volume, at 14° R. (63.5° F.).—MEISSNER.

Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.	Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.
100	0	0.7932	0.7932	49	51	0.9196	0.9324
99	1	0.796	0.7969	48	52	0.9219	0.9344
98	2	0.7988	0.8006	47	53	0.9242	0.9364
97	3	0.8016	0.8042	46	54	0.9264	0.9384
96	4	0.8045	0.8078	45	55	0.928	0.9404
95	5	0.8074	0.8114	44	56	0.9308	0.9424
94	6	0.8104	0.815	43	57	0.9329	0.9443
93	7	0.8135	0.8185	42	58	0.9350	0.9461
92	8	0.8166	0.8219	41	59	0.9371	0.9478
91	9	0.8196	0.8253	40	60	0.9391	0.9495
90	10	0.8225	0.8286	39	61	0.9410	0.9512
89	11	0.8252	0.8317	38	62	0.9429	0 9529
88	12	0.8279	0.8346	37	63	0.9448	0.9547
87	13	0.8304	0.8373	36	64	0.9467	0.9564
86	14	0.8329	0.840	35	65	0.9486	0.958
85	15	0.8353	0.8427	34	66	0.9505	0.9595
84	16	0.8376	0.8454	33	67	0.9524	0.9609
83	17	0.8399	0.8481	32	68	0.9543	0.9621
82	18	0.8422	0.8508	31	69	0.9561	0.9632
81	19	0.8446	0.8534	30	70	0.9578	0.9643
80	20	0.847	0.8561	29	71	0.9594	0.9654
79	21	0.8494	0.8596	28	72	0.9608	0.9665
78	22	0.8519	0.8616	27	73	0.9621	0.9676
77	23	0.8543	0.8642	26	74	0.9634	0.9688
76	24	0.8567	0.8668	25	75	0.9647	0.970
75	25	0.859	0.8695	24	76	0.966	0.9712
74	26	0.8613	0.8723	23	77	0.9673	0.9723
73	27	0.8635	0.8751	22	78	0.9686	0.9734
72	28	0.8657	0.8779	21	79	0.9699	0.9745
71	29	0.868	0.8806	20	80	0.9712	0.9756
70	30	0.8704	0.8833	19	81	0.9725	0.9766
69	31	0.8729	0.886	18	82	0.9738	0.9775
68	32	0.8755	0.8885	17	83	0.9751	0.9784
67	33	0.8781	0.891	16	84	0.9763	0.9793
66	34	0.8806	0.8934	15	85	0.9795	0.9803
65	35	0.8831	0.8958	14	86	0.9786	0.9813
64	36	0.8855	0.8982	13	87	0.9796	0.9823
63	37	0.8879	0.9096	12	88	0.9806	0.9834
62	38	0.8902	0.9029	11	89	0.9817	0.9846
61	39	0.8925	0.9052	10	90	0.9830	0.9859
60	40	0.8948	0.9075	9	91	0.9844	0.9873
59	41	0.8971	0.9098	8	92	0.9860	0.9888
58	42	0.8994	0.9121	7	93	0.9873	0.9901
57	43	0.9016	0.9145	6	94	0.9897	0.9915
56	44	0.9038	0.9168	5	95	0.9914	0.9929
55	45	0.9060	0.9191	4	96	0.9931	0.9943
54	46	0.9082	0.9124	3	97	0.9948	0.9957
53	47	0.9104	0.9237	2	98	0.9965	0.9971
52	48	0.9127	0.9159	1	99	0.9982	0.9985
51	49	0.915	0.9281	0	100	1.0000	1.0000
50	50	0.6173	0.9303	--	--	--	--

THE SIMPLIFICATION OF EMULSION CALCULATIONS.

From British Journal of Photography Almanac.

With a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognized style will find their labors materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide....	98.	1.734	.576	1.918	.521	
Potassium "	119.1	1.427	.700	1.578	.633	
Sodium "	103.	1.650	.606	1.825	.548	
Cadmium " com.	172.	.988	1.012	1.093	.915	1.106
" " anh.	136.	1.25	.800	1.382	.723	
Zinc "	112.1	1.509	.663	1.670	.600	
Ammonium chloride....	53.5	3.177	.315	2.682	.373	.844
Sodium "	58.5	2.906	.344	2.453	.408	
Ammonium iodide......	145.	1.172	.853	1.620	.617	
Potassium "	166.1	1.023	.977	1.415	.707	1.382
Sodium "	150.	1.133	.882	1.566	.638	
Cadmium "	183.	.929	1.076	1.284	.778	

The principal bromides, chlorides and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. 1 presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:

Bromide of potassium............	150 grains.	Chloride of ammonium..........	10 grains.
Iodide of potassium..............	10 "	Gelatine..........................	200 "

Now, we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:

Potassium bromide............................	$150 \times 1.427 = 214.$	Weight
" iodide............................	$10 \times 1.023 = 10.23$	silver nitrate
Chloride of ammonium..........................	$10 \times 3.177 = 31.77$	required.

or the total quantity of silver nitrate required for full conversion.. 256. grains.

No. II.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide (Coml.)	Cadmium Bromide (Anhyd.).	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide....	1	.823	.951	.57	.72	.87	1.832	1.675	.676	.59	.653	.535
Potassium "	1.215	1	1.156	.692	.876	1.058	2.226	2.036	.821	.717	.794	.651
Sodium "	1.051	.865	1	.599	.757	.915	1.925	1.761	.71	.62	.686	.563
Cadmium " com.	1.755	1.444	1.67	1	1.265	1.527	3.215	2.94	1.186	1.035	1.146	.94
" " anh.	1.387	1.141	1.32	.79	1	1.207	2.542	2.324	.938	.819	.906	.743
Zinc "	1.140	.945	1.093	.655	.828	1	2.104	1.925	.776	.678	.75	.615
Ammonium chloride.....	.546	.449	.519	.311	.393	.475	1	.914	.369	.322	.356	.292
Sodium "	.597	.491	.568	.34	.43	.519	1.093	1	.403	.352	.39	.319
Ammonium iodide......	1.479	1.217	1.408	.843	1.066	1.287	2.712	2.478	1	.873	.966	.792
Potassium "	1.695	1.394	1.612	.965	1.221	1.475	3.104	2.839	1.145	1	1.107	.907
Sodium "	1.53	1.259	1.456	.872	1.103	1.332	2.803	2.564	1.034	.903	1	.819
Cadmium "	1.867	1.536	1.776	1.064	1.345	1.625	3.42	3.128	1.262	1.102	1.22	1

Table No. II gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in large type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide, we take the number in the same column which stands against the latter salt in the margin, viz., 1.215; that is to say, 1.215 grain of potassium bromide will be required to do the same work as one.

PREPARING PERCENTAGE SOLUTIONS.

By C. C. Sherrard, Ph. C.

The first table gives percentage solutions; the second gives parts in 1,000 or less. The use of the first is as follows: Run down column one until the correct percentage wanted is found, then move to the right along the line until the column is found giving the amount of fluid measure to be made up; at the intersection will be found the weight of salt required. It must be remembered that this is the amount of water to take, and not q. s. water to make the volume; also that these tables are true only for water, and not for alcohol or other fluids.

For Making any Quantity of Percentage Solutions.

	For each 1 fluid ounce of water take of the salt	For each 2 fluid ounces of water take of the salt	For each 3 fluid ounces of water take of the salt	For each 4 fluid ounces of water take of the salt	For each 5 fluid ounces of water take of the salt	For each 10 fluid ounces of water take of the salt	For each 16 fluid ounces of water take of the salt
To make	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
1 per cent	4.557	9.114	13.671	18.228	22.785	45.57	72.912
2 per cent	9.114	18.228	27.342	36.456	45.570	91.14	145.824
3 per cent	13.671	27.352	41.013	54.684	68,355	136.71	218.416
4 per cent	18.228	36.456	54.684	72.912	91.14	182.28	291.648
5 per cent	22.785	45.57	68.355	91.14	113.925	227.85	364.56
10 per cent	45.57	91.14	136.71	182.28	227.85	455.7	729.12
15 per cent	68.355	136.71	205.065	273.42	341.775	68.355	1093.68
20 per cent	91.14	182.28	273.42	364.56	455.70	911.4	1458.24
25 per cent	113.925	227.85	341.775	455.70	569.625	1139.25	1822.80
40 per cent	182.28	364.56	546.84	729.12	911.4	1822.8	2916.48

For Making any Quantity of Solution When Stated in Parts per 1,000, 100, etc.

	For each 1 fluid ounce of water take of the salt	For each 2 fluid ounces of water take of the salt	For each 3 fluid ounces of water take of the salt	For each 4 fluid ounces of water take of the salt	For each 5 fluid ounces of water take of the salt	For each 10 fluid ounces of water take of the salt	For each 16 fluid ounces of water take of the salt
To make solution of	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
1 in 1,000	.4557	.9114	1.3671	1.8228	2.278	4.557	7.291
1 in 500	.9114	1.8228	2.7342	3.6456	4.557	9.114	14.582
1 in 400	1.139	2.278	3.4177	4.557	5.695	11.392	18.228
1 in 300	1.519	3.035	4.557	6.076	7.59	15.19	24.304
1 in 200	2.2785	4.557	6.8355	9.114	11.39	22.785	36.456
1 in 100	4.557	9.114	13.671	18.228	22.785	45.57	72.912
1 in 50	9.114	18.228	27.342	36.456	45.57	91.14	145.824
1 in 25	18.228	36.456	54.684	72.912	91.14	182.28	291.648
1 in 10	45.570	91.140	136.710	182.280	227.85	455.70	729.120
1 in 5	91.14	182.28	273.42	364.56	455.7	911.4	1458.24

We may say that, in giving the above figures, the resulting solution is correct as regards percentage composition, though it may measure slightly more than the water taken, owing to the increase in volume which always take place in some degree when a solid passes into a solution in a given amount of liquid. This expansion is not appreciable for small amounts of the solid, say up to 5 per cent., but at 25 per cent. or more it may be noticeable.

THE CONVERSION OF GRAMMES (OR CUBIC CENTIMETERS) INTO OUNCES AND GRAINS, and *vice versa*.

Conversion of Grammes into Grains.

Grammes.	Grains.
1	15.43
2	30.86
3	46.29
4	61.73
5	77.16
6	92.59
7	108.03
8	123.46
9	138.89

Conversion of Grains into Grammes.

Grains.	Grammes.
1	.0648
2	.1296
3	.1944
4	.2592
5	.3240
6	.3888
7	.4536
8	.5184
9	.5832

Conversion of Grammes into Troy Ounces.

Grammes.	Troy Ounces.
1	.03215
2	.06430
3	.09645
4	.12860
5	.16075
6	.19290
7	.22505
8	.25720
9	.28935

Conversion of Troy Ounces into Grammes.

Troy Ounces.	Grammes.
1	31.103
2	62.207
3	93.310
4	124.414
5	155.517
6	186.621
7	217.724
8	248 828
9	279.931

Conversion of Grammes into Avoirdupois Ounces.

Grammes.	Avoirdupois Ounces.
1	.03527
2	.07054
3	.10581
4	.14108
5	.17635
6	.21162
7	.24689
8	.28216
9	.31743

Conversion of Avoirdupois Ounces into Grammes.

Avoirdupois Ounces.	Grammes.
1	28.349
2	56.699
3	85.048
4	113.398
5	141.747
6	170.097
7	198.446
8	226.796
9	255.145

The use of the tables will be best illustrated by an example. Supposing that it is desired to find the equivalent in grains of 324.51 grammes, we proceed by breaking up this number into the following series of constituent parts, and finding the grain-equivalent of each part from the table.

Portions of original number.	Equivalents in grains.
300.	4630.
20.	308.6
4.	61.73
.50	7.716
.01	.1524
	5008.1984

The required quantity is 5008.2 grains. The numbers taken from the table will, in most cases, require a change as regards the position of the decimal point; thus, to find the value of 300 grammes, one refers to the table and finds 46.30 given as the equivalent, and a mere shifting of the decimal point two places towards the right multiplies this by 100, or gives the required number. In a similar manner, by shifting the decimal place of 30.86 one place to the right, we obtain the value in grains of 20 grammes; while the number 61.73 is taken from the table without alteration as the equivalent of 4 grammes. For .50 the table number must have its point shifted to the left, making it 7.716 instead of 77.16; and finally the value of .01 is obtained by shifting the point of 15.43 two places to the left.

THERMOMETRIC TABLES.

Showing the Assimilation of the Thermometers in Use Throughout the World.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80.0	212.0	49	39.2	120.2
99	79.2	210.0	48	38.4	118.4
98	78.4	208.4	47	37.6	116.6
97	77.6	206.6	46	36.8	114.8
96	76.8	204.8	45	36.0	113.0
95	76.0	203.0	44	35.2	111.2
94	75.2	201.2	43	34.8	109.4
93	74.4	199.4	42	33.6	107.6
92	73.6	197.6	41	32.8	105.8
91	72.8	195.8	40	32.0	104.0
90	72.0	194.0	39	31.2	102.2
89	71.2	192.2	38	30.4	100.4
88	70.4	190.4	37	29.6	98.6
87	69.6	188.6	36	28.8	96.8
86	68.8	186.8	35	28.0	95.0
85	68.0	185.0	34	27.2	93.2
84	67.2	183.2	33	26.4	91.4
83	66.4	181.4	32	25.6	89.6
82	65.6	179.6	31	24.8	87.8
81	64.8	177.8	30	24.0	86.0
80	64.0	176.0	29	23.2	84.2
79	63.2	174.2	28	22.4	82.4
78	62.4	172.4	27	21.6	80.6
77	61.6	170.6	26	20.8	78.8
76	60.8	168.8	25	20.0	77.0
75	60.0	167.0	24	19.2	75.2
74	59.2	165.2	23	18.4	73.4
73	58.4	163.4	22	17.6	71.6
72	57.6	161.6	21	16.8	69.8
71	56.8	159.8	20	16.0	68.0
70	56.0	158.0	19	15.2	66.2
69	55.2	156.2	18	14.4	64.4
68	54.4	154.4	17	13.6	62.6
67	53.6	152.6	16	12.8	60.8
66	52.8	150.8	15	12.0	59.0
65	52.0	149.0	14	11.2	57.2
64	51.2	147.2	13	10.4	55.4
63	50.4	145.4	12	9.6	53.6
62	49.6	143.6	11	8.8	51.8
61	48.8	141.8	10	8.0	50.0
60	48.0	140.0	9	7.2	48.2
59	47.2	138.2	8	6.4	46.4
58	46.4	136.4	7	5.6	44.6
57	45.6	134.6	6	4.8	42.8
56	44.8	132.8	5	4.0	41.0
55	44.0	131.0	4	3.2	39.2
54	43.2	129.2	3	2.4	37.4
53	42.4	127.4	2	1.6	36.5
52	41.6	125.6	1	0.8	33.8
51	40.8	123.8	0	0.0	32.0
50	40.0	122.0			

DR. SCOTT'S TABLE OF COMPARATIVE EXPOSURES.

The following table, compiled by Dr. J. A. Scott, shows the comparative value of daylight at different hours of the day and seasons of the year, and is intended for use in conjunction with that of Mr. W. K. Burton :

Table of Comparative Exposures.

Hour of Day. A.M.	Hour of Day. P.M.	June.	May, July.	April, Aug.	Mar., Sept.	Feb., Oct.	Jan., Nov.	Dec.
12		1	1	1¼	1½	2	3½	4
11	1	1	1	1¼	1½	2½	4	5
10	2	1	1	1¼	1¾	3	5	6
9	3	1	1¼	1½	2	4	*12	*16
8	4	1½	1½	2	3	*10	--	--
7	5	2	2½	3	*6	--	--	--
6	6	2½	*3	*6	--	--	--	--
5	7	*5	*6	--	--	--	--	--
4	8	*12	--	--	--	--	--	--

* The accuracy of these figures would be affected by a yellow sunset.

MR. BURTON'S TABLE OF COMPARATIVE EXPOSURES

(SLIGHTLY ALTERED).

	Sea and Sky.	Open Landscape.	Landscape and Foreground. / Buildings.	Heavy Foliage. Foreground. / Portrait out of Doors.	Portrait in Studio Light.	Portrait in Ordinary Room.	Under Trees. / Fairly Lighted Interiors.	Badly Lighted Interiors.
$\frac{F}{16}$	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	1 sec.	2 sec.	16 sec.	1 min.	$2\frac{1}{2}$ min.	$\frac{1}{2}$ hour.
$\frac{F}{32}$	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	4 sec.	8 sec.	1 min.	4 min.	10 min.	2 hours.
$\frac{F}{64}$	$1\frac{1}{2}$ sec.	5 sec.	16 sec.	32 sec.	4 min.	16 min.	40 min.	8 hours.

ENLARGEMENTS.

From the British Journal of Photography Almanac.

FOCUS OF LENS.	TIMES OF ENLARGEMENT AND REDUCTION.							
Inches.	**1** Inch.	**2** Inches.	**3** Inches.	**4** Inches.	**5** Inches.	**6** Inches.	**7** Inches.	**8** Inches.
2	4 4	6 3	8 $2\frac{3}{4}$	10 $2\frac{1}{2}$	12 $2\frac{2}{5}$	14 $2\frac{1}{3}$	16 $2\frac{2}{7}$	18 $2\frac{1}{4}$
$2\frac{1}{2}$	5 5	$7\frac{1}{2}$ $3\frac{3}{4}$	10 $3\frac{1}{3}$	$12\frac{1}{2}$ $3\frac{1}{8}$	15 3	$17\frac{1}{2}$ $2\frac{11}{12}$	20 $2\frac{6}{7}$	$22\frac{1}{2}$ $2\frac{13}{16}$
3	6 6	9 $4\frac{1}{2}$	12 4	15 $3\frac{3}{4}$	18 $3\frac{3}{5}$	21 $3\frac{1}{2}$	24 $3\frac{3}{7}$	27 $3\frac{3}{8}$
$3\frac{1}{2}$	7 7	$10\frac{1}{2}$ $5\frac{1}{4}$	14 $4\frac{2}{3}$	$17\frac{1}{2}$ $4\frac{3}{4}$	21 $4\frac{1}{5}$	$24\frac{1}{2}$ $4\frac{1}{12}$	28 4	$31\frac{1}{2}$ $3\frac{15}{16}$
4	8 8	12 6	16 $5\frac{1}{4}$	20 5	24 $5\frac{4}{5}$	28 $4\frac{2}{3}$	32 $4\frac{4}{7}$	36 $4\frac{1}{2}$
$4\frac{1}{2}$	9 9	$13\frac{1}{2}$ $6\frac{3}{4}$	18 6	$22\frac{1}{2}$ $5\frac{5}{8}$	27 $5\frac{2}{5}$	$31\frac{1}{2}$ $5\frac{1}{4}$	36 $5\frac{1}{7}$	$40\frac{1}{2}$ $5\frac{1}{16}$
5	10 10	15 $7\frac{1}{2}$	20 $6\frac{2}{3}$	25 $6\frac{1}{4}$	30 6	35 $5\frac{5}{6}$	40 $5\frac{5}{7}$	45 $5\frac{5}{8}$
$5\frac{1}{2}$	11 11	$16\frac{1}{2}$ $8\frac{1}{4}$	22 $8\frac{1}{8}$	$27\frac{1}{2}$ $6\frac{7}{8}$	33 $6\frac{1}{2}$	$38\frac{1}{2}$ $6\frac{5}{12}$	44 $6\frac{2}{7}$	$49\frac{1}{2}$ $6\frac{3}{16}$
6	12 12	18 9	24 8	30 $7\frac{1}{2}$	36 $7\frac{1}{6}$	42 7	48 $6\frac{6}{7}$	54 $6\frac{3}{4}$
7	14 14	21 $10\frac{1}{2}$	28 $9\frac{1}{3}$	35 $8\frac{3}{4}$	42 $8\frac{2}{5}$	49 $8\frac{1}{6}$	56 8	63 $7\frac{7}{8}$
8	16 16	24 12	32 $10\frac{2}{3}$	40 10	48 $9\frac{3}{5}$	56 $9\frac{1}{3}$	64 $9\frac{1}{7}$	72 9
9	18 18	27 $13\frac{1}{2}$	36 12	45 $11\frac{1}{4}$	54 $10\frac{4}{5}$	63 $10\frac{1}{2}$	72 $10\frac{2}{7}$	81 $10\frac{1}{8}$

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration : A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—7½. The greater of these is the distance the sensitive plate must be from the centre of the lens ; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied ; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2, and so on with any other numbers.

COMPARATIVE EXPOSURES FOR ENLARGING AND REDUCING.

Compiled by Mr. E. Ferrero, (Camera Club, London).

f/16	f/18	f/20	f/22	f/24	f/26	f/28	f/32	f/36	f/40	f/44	f/48	f/52
m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0 9	0 11	0 14	0 17	0 20	0 23	0 27	0 36	0 45	0 55	1 7	1 20	1 34
0 13	0 16	0 21	0 25	0 30	0 34	0 40	0 54	1 7	1 23	1 41	2 0	2 20
0 18	0 22	0 28	0 32	0 40	0 46	0 54	1 12	1 30	1 51	2 15	2 40	3 7
0 22	0 28	0 35	0 42	0 50	0 58	1 8	1 30	1 52	2 18	2 48	3 20	3 54
0 27	0 33	0 42	0 50	1 0	1 9	1 21	1 48	2 15	2 46	3 22	4 0	4 40
0 36	0 45	0 55	1 15	1 19	1 33	1 48	2 24	3 0	3 42	4 29	5 20	6 15
0 45	0 55	1 10	1 24	1 40	1 54	2 15	3 0	3 42	4 37	5 36	6 40	7 48
0 55	1 6	1 23	1 38	1 59	2 18	2 42	3 36	4 30	5 33	6 44	8 0	9 21
1 3	1 18	1 37	1 54	2 19	2 42	3 9	4 12	5 15	6 28	7 52	9 20	10 55
1 12	1 30	1 50	2 10	2 38	3 7	3 36	4 48	6 0	7 24	8 58	10 40	12 30
1 21	1 40	2 5	2 30	2 59	3 29	4 4	5 24	6 42	8 19	10 5	12 0	14 3
1 30	1 50	2 20	2 50	3 20	3 48	4 30	6 0	7 22	9 12	11 12	13 20	15 36
1 48	2 12	2 46	3 16	4 0	4 36	5 24	7 12	8 52	11 5	13 28	16 0	18 40
2 6	2 35	3 13	3 48	4 37	5 23	6 18	8 24	10 30	12 56	15 43	18 40	21 50
2 24	3 0	3 40	4 20	5 17	6 14	7 12	9 36	12 0	14 48	17 55	21 20	25 0
2 42	3 20	4 10	4 58	5 58	6 58	8 7	10 48	13 24	16 36	20 10	24 0	28 6
3 0	3 40	4 40	5 36	6 40	7 36	9 0	12 0	14 44	18 25	22 24	26 40	31 12
3 22	4 10	5 15	6 18	7 30	8 33	10 10	13 30	16 36	20 48	25 12	30 0	35 10
3 45	4 36	5 50	7 0	8 19	9 30	11 15	15 0	18 24	23 0	28 0	33 20	39 4
4 7	5 5	6 25	7 42	9 9	10 27	12 27	16 30	20 18	25 20	30 48	36 40	42 57
4 30	6 30	7 0	8 24	10 0	11 24	13 30	18 0	22 6	27 40	33 36	40 0	46 54

COMPARATIVE EXPOSURES FOR ENLARGING AND REDUCING—*Continued.*

f/56	f/60	f/64	f/68	f/72	f/76	f/80	f/84	f/88	f/92	f/96	f/100
m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
1 48	2 5	2 22	2 40	3 0	3 20	3 42	4 4	4 28	4 54	5 20	5 47
2 42	3 7	3 33	4 0	4 30	5 0	5 33	6 6	6 42	7 21	8 0	8 40
3 37	4 10	4 44	5 20	6 0	6 40	7 24	8 9	8 57	9 48	10 40	11 33
4 30	5 17	5 55	6 40	7 30	8 21	9 15	10 9	11 12	12 17	13 20	14 27
5 25	6 15	7 5	8 0	9 0	10 1	11 6	12 12	13 25	14 42	16 0	17 20
7 12	8 20	9 28	10 40	12 0	13 22	14 48	16 17	17 54	19 36	21 20	23 7
9 0	10 34	11 50	13 22	15 0	16 42	18 30	20 21	22 23	24 33	26 40	28 54
10 50	12 30	14 10	16 1	18 0	20 2	22 12	24 25	26 50	29 24	32 0	34 40
12 40	14 34	16 33	18 42	21 0	23 23	25 54	28 30	31 19	34 18	37 20	40 27
14 24	16 48	18 55	21 22	24 0	26 43	29 36	32 33	35 48	39 12	42 40	46 15
16 12	18 45	21 18	24 3	27 0	30 3	33 18	36 38	40 17	44 10	48 0	52 0
18 0	21 8	23 40	26 44	30 0	33 24	37 0	40 42	44 46	48 56	53 20	57 48
21 40	24 58	28 21	32 0	36 0	40 5	44 24	48 50	53 40	58 48	64 0	69 0
25 20	29 7	33 6	37 23	42 0	46 45	51 48	57 0	62 39	69 0	74 40	81 0
28 48	33 17	37 50	42 43	48 0	53 27	59 12	65 7	71 36	78 0	85 0	92 0
32 36	37 30	42 35	48 5	54 0	60 6	66 36	73 15	80 20	88 0	96 0	104 0
36 0	42 17	47 20	53 28	60 0	66 47	74 0	81 24	89 0	98 0	106 0	116 0
40 48	46 50	53 15	60 20	67 27	75 8	83 15	91 31	100 0	110 0	120 0	130 0
45 0	52 50	59 10	66 40	74 55	83 30	92 30	101 38	111 0	122 0	133 0	144 0
49 51	58 13	65 5	73 30	82 25	91 0	101 45	111 45	124 0	135 0	146 0	159 0
54 0	63 26	71 0	80 0	89 55	100 10	111 0	122 6	134 0	147 0	160 0	174 0

DR. WOODMAN'S TABLE OF VIEW ANGLES.

DIVIDE THE BASE OF THE PLATE BY THE EQUIVALENT FOCUS OF THE LENS.

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees.		Degrees.		Degrees.
.282	16	.748	41	1.3	66
.3	17	.768	42	1.32	67
.317	18	.788	43	1.36	68
.335	19	.808	44	1.375	69
.353	20	.828	45	1.4	70
.37	21	.849	46	1.427	71
.389	22	.87	47	1.45	72
.407	23	.89	48	1.48	73
.425	24	.911	49	1.5	74
.443	25	.933	50	1.53	75
.462	26	.854	51	1.56	76
.48	27	.975	52	1.59	77
.5	28	1.	53	1.62	78
.517	29	1.02	54	1.649	79
.536	30	1.041	55	1.678	80
.555	31	1.063	56	1.7	81
.573	32	1.086	57	1.739	82
.592	33	1.108	58	1.769	83
.611	34	1.132	59	1.8	84
.631	35	1.155	60	1.833	85
.65	36	1.178	61	1.865	86
.67	37	1.2	62	1.898	87
.689	38	1.225	63	1.931	88
.708	39	1.25	64	1.965	89
.728	40	1.274	65	2.	90

This table has been calculated for the use of those who wish to know the precise *angle of view* included by any particular lens on a given size of plate. Its mode of use will be easily seen by inspection.

SIZES OF DRY PLATES MADE IN FRANCE AND GERMANY.

6½ × 9 c. m.	2.5 × 3.6 inches.	21 × 29 c. m.	8.2 × 10.6 inches.
9 × 12 "	3.6 × 4.7 "	24 × 30 "	9.4 × 11.8 "
12 × 15 "	4.7 × 5.9 "	27 × 33 "	10.6 × 12.9 "
13 × 18 "	5.1 × 7.0 "	27 × 35 "	10.6 × 13.7 "
12 × 20 "	4.7 × 7.8 "	30 × 40 "	11.8 × 15.7 "
15 × 21 "	5.9 × 8.2 "	40 × 50 "	15.7 × 19.6 "
15 × 22 "	5.9 × 8.6 "	50 × 60 "	19.6 × 23.6 "
18 × 24 "	7.2 × 9.4 "		

SIZES OF DRY PLATES MADE IN ITALY.

9 × 12 c. m.	3.6 × 4.9 inches.	21 × 29 c. m.	8.2 × 10.6 inches.
12 × 16 "	4.7 × 6.3 "	24 × 30 "	9.4 × 11.8 "
12 × 18 "	4.7 × 7.2 "	29 × 33 "	10.6 × 12.0 "
13 × 18 "	5.1 × 7.0 "	30 × 36 "	11.8 × 14.1 "
12 × 20 "	4.7 × 7.8 "	40 × 50 "	15.7 × 19.6 "
18 × 24 "	7.0 × 9.4 "	50 × 60 "	19.6 × 23.6 "

EQUATIONS RELATING TO FOCI, Etc.

The following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:

Let p = Principal focus.
F = Greater conjugate do.
f = Lesser do. do.
$D = F + f$ = distance of image from object.
r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Effective diameter of diaphragm.
U. S. No. = "Uniform System" No. of do.
x = Comparative exposure required.

Then

$$p = D \times \frac{r}{(r+1)^2} = \frac{Ff}{D} = \frac{F}{r+1} = \frac{rf}{r+1}$$

$$F = p\,(r+1) = \frac{pf}{f-p} = rf = \frac{rD}{r+1}$$

$$f = p \times \frac{(r+1)}{r} = \frac{pF}{F-p} = \frac{D}{r+1} = \frac{F}{r}$$

$$D = p \times \frac{(r+1)^2}{r} = f\,(r+1) = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$\text{U. S. No.} = \frac{p^2}{16\,a^2}$$

$$x = \frac{f^2}{16\,a^2} = \frac{p^2}{16\,a^2} \times \frac{(r+1)^2}{r^2}$$

N. B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

Note.—In case the above may not be clear to some photographers, the following rules may be better understood:

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground-glass (D); next find the proportion which any dimension in the object bears to the same dimension on the ground-glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply D by r, and divide the product by the square of a number greater by one than r $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known) multiply p by the sum of $r + 1$ and divide the product by r. Or divide D by $r + 1$.

To find the greater conjugate focus (F) multiply p by $r + 1$. Or multiply f by r.

To find D (the distance which the ground-glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F - p$ (the difference between F and p) by p. Or divide p by $f - p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example: Focus an object which is five inches high, so that it is one inch high on the ground-glass: thus we know that $r = 5$. Next measure the distance between the object and the ground-glass (D), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 5\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$D = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

ELSDEN'S TABLE OF POISON AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidotes.
Vegetable Acids....	OXALIC ACID including POTASSIUM OXALATE.	1 drachm is the smallest fatal dose known.	Hot burning sensation in throat and stomach; vomiting, cramps, and numbness	Chalk, whiting or magnesia suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies....	AMMONIUM " ...... POTASSIUM " ...... SODIUM "	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts......	MERCURIC CHLORIDE......	3 grains the smallest known fatal dose.	Acid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomitiug.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	ACETATE OF LEAD.........	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	CYANIDE OF POTASSIUM...	*a.* Taken internally, 3 grs. fatal.	Insensibility, slow gasping respiration, dilated pupils and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	BICHROMATE OF POTASSIUM	*a.* Taken internally.	Irritant pain in stomach and vomiting.	Emetics and magnesia, or chalk.
		b. Applied to slight abrasions of the skin.	Produces troublesome sores and ulcers.	
	NITRATE OF SILVER........		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids........	NITRIC ACID..............	2 drachms have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe, and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk; plaster of the apartment beaten up in water.
	HYDROCHLORIC ACID.......	½ ounce has caused death.		
	SULPHURIC ACID...........	1 drachm has been fatal.		

ACETIC ACID, concentrated, has as powerful an effect as the mineral acids.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidotes.
	IODINE	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrow-root and starch given freely.
	ETHER....................	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
	PYROGALLOL.............	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

TELE-PHOTO LENS.

TABLE SHOWING CAMERA EXTENSION NECESSARY FOR VARIOUS SIZES OF PLATES IN CURRENT USE.

Back focus.	Plate Covered.	6-inch positive and 3-inch negative.		8-inch positive and 4-inch negative.		10-inch positive and 5-inch negative.		12-inch positive and 6-inch negative.	
		Equivalent focus.	Intensity at full aperture.	Equivalent focus.	Intensity at full aperture.	Equivalent focus.	Intensity at full aperture.	Equivalent focus.	Intensity at full aperture.
$4\frac{3}{4}$ inches..	$3\frac{1}{4}$ by $3\frac{1}{4}$	$15\frac{1}{2}$	$\frac{1}{20\frac{2}{3}}$	$17\frac{1}{2}$	$\frac{1}{17\frac{1}{2}}$	$19\frac{1}{2}$	$\frac{1}{15.6}$	$21\frac{1}{2}$	$\frac{1}{14\frac{1}{3}}$
$5\frac{1}{2}$ " ..	$4\frac{1}{4}$ by $3\frac{1}{4}$	17	$\frac{1}{22\frac{2}{3}}$	19	$\frac{1}{19}$	21	$\frac{1}{16.8}$	23	$\frac{1}{15\frac{1}{3}}$
$6\frac{1}{2}$ " ..	5 by 4	19	$\frac{1}{25\frac{1}{3}}$	21	$\frac{1}{21}$	23	$\frac{1}{18\ 4}$	25	$\frac{1}{16\frac{2}{3}}$
8 " ..	$6\frac{1}{2}$ by $4\frac{3}{4}$	22	$\frac{1}{29\frac{1}{3}}$	24	$\frac{1}{24}$	26	$\frac{1}{20.8}$	28	$\frac{1}{18\frac{2}{3}}$
$10\frac{3}{4}$ " ..	$8\frac{1}{2}$ by $6\frac{1}{2}$	$27\frac{1}{2}$	$\frac{1}{36\frac{2}{3}}$	$29\frac{1}{2}$	$\frac{1}{29\frac{1}{2}}$	$31\frac{1}{2}$	$\frac{1}{25.2}$	$33\frac{1}{2}$	$\frac{1}{22\frac{1}{3}}$
13 " ..	10 by 8	32	$\frac{1}{42\frac{2}{3}}$	34	$\frac{1}{34}$	36	$\frac{1}{28.8}$	38	$\frac{1}{25\frac{1}{3}}$
$15\frac{3}{4}$ " ..	12 by 7	$37\frac{1}{2}$	$\frac{1}{50}$	$39\frac{1}{2}$	$\frac{1}{39\frac{1}{2}}$	$41\frac{1}{2}$	$\frac{1}{33.2}$	$43\frac{1}{2}$	$\frac{1}{29}$
$19\frac{1}{4}$ " ..	15 by 12	$44\frac{1}{2}$	$\frac{1}{59\frac{1}{3}}$	$46\frac{1}{2}$	$\frac{1}{46\frac{1}{2}}$	$48\frac{1}{2}$	$\frac{1}{38.8}$	$50\frac{1}{2}$	$\frac{1}{33\frac{2}{3}}$
$24\frac{1}{4}$ " ..	18 by 16	$54\frac{1}{2}$	$\frac{1}{72\frac{2}{3}}$	$56\frac{1}{2}$	$\frac{1}{56\frac{1}{2}}$	$58\frac{1}{2}$	$\frac{1}{46.8}$	$60\frac{1}{2}$	$\frac{1}{40\frac{1}{3}}$
$29\frac{1}{4}$ " ..	22 by 20	$64\frac{1}{2}$	$\frac{1}{86}$	$66\frac{1}{2}$	$\frac{1}{66\frac{1}{2}}$	$68\frac{1}{2}$	$\frac{1}{54.8}$	$70\frac{1}{2}$	$\frac{1}{47}$
$32\frac{3}{4}$ " ..	25 by 21	$71\frac{1}{2}$	$\frac{1}{95\frac{1}{3}}$	$73\frac{1}{2}$	$\frac{1}{73\frac{1}{2}}$	$75\frac{1}{2}$	$\frac{1}{60.4}$	$77\frac{1}{2}$	$\frac{1}{51\frac{2}{3}}$
$38\frac{1}{2}$ " ..	30 by 24	83	$\frac{1}{110\frac{2}{3}}$	85	$\frac{1}{85}$	87	$\frac{1}{69.6}$	89	$\frac{1}{59\frac{1}{3}}$
$48\frac{1}{4}$ " ..	34 by 34	$102\frac{1}{2}$	$\frac{1}{136\frac{2}{3}}$	$104\frac{1}{2}$	$\frac{1}{104\frac{1}{2}}$	$106\frac{1}{2}$	$\frac{1}{85.2}$	$108\frac{1}{2}$	$\frac{1}{72\frac{1}{3}}$

FREEZING MIXTURES.

	Ingredients.	Parts by Weight.	Temperature Produced Starting at 10° C.	Diminution of Temperature.
1	Water	1	—16° C.	26° C.
	Nitrate of ammonia	1		
2	Water	16	—12°	22°
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	—19°	29°
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	5	--	20°
	Chloride of sodium	2		
5	Snow	1	--	45°
	Crystallized chloride of calcium	2		
6	Crystallized sulphate of soda	8	—20°	30°
	Hydrochloric acid	5		

SIZES OF MOUNTS IN COMMON USE.

Minette	$1\frac{1}{2}$ x $2\frac{3}{8}$	Victoria	$3\frac{1}{4}$ x 5
Petite	$1\frac{5}{8}$ x $3\frac{1}{8}$	Cabinet	$4\frac{1}{4}$ x $6\frac{1}{2}$
Milieu	$1\frac{3}{4}$ x $4\frac{3}{16}$	Promenade	$4\frac{1}{8}$ x $7\frac{1}{8}$
Quadra	$2\frac{1}{2}$ x $2\frac{1}{2}$	Panel	4 x $8\frac{1}{4}$
Carré	3 x 3	Boudoir	$5\frac{1}{4}$ x $8\frac{1}{2}$
Longa	$2\frac{7}{8}$ x $6\frac{1}{2}$	Imperial	$6\frac{7}{8}$ x $9\frac{7}{8}$
Card	$2\frac{1}{4}$ x $4\frac{1}{8}$	Other sizes expressed in inches.	

Size of blotting paper, 19 x 24.

THE LANTERNIST'S READY REFERENCE TABLE.

Distance between Lantern and Screen.	Focus of Lens. 4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.	12 in.	13 in.	14 in.	15 in.
	Diameter of Disc.											
	ft. in.	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*	*ft. in.*
10 feet......	7 6	6 0	5 0	4 3	3 9	3 4	3 0	2 9	2 6	2 4	2 2	2 0
11 "	8 3	6 7	5 6	4 9	4 2	3 8	3 4	3 0	2 9	2 6	2 4	2 2
12 "	9 0	7 2	6 0	5 2	4 6	4 0	3 7	3 3	3 0	2 9	2 7	2 5
13 "	9 9	7 10	6 6	5 7	4 11	4 4	3 11	3 7	3 3	3 0	2 9	2 7
14 "	10 6	8 5	7 0	6 0	5 3	4 8	4 2	3 10	3 7	3 3	3 0	2 9
15 "	11 3	9 0	7 6	6 5	5 8	5 0	4 6	4 1	3 9	3 6	3 3	3 0
20 "	15 0	12 0	10 0	8 7	7 6	6 8	6 0	5 6	5 0	4 7	4 3	4 0
25 "	18 9	15 0	12 6	10 9	9 4	8 4	7 6	6 10	6 3	5 9	5 4	5 0
30 "	22 6	18 0	15 0	12 10	11 3	10 0	9 0	8 2	7 6	6 11	6 5	6 0
35 "	26 3	21 0	17 6	15 0	13 1	11 8	10 6	9 6	8 9	8 1	7 6	7 0
40 "	30 0	24 0	20 0	17 2	15 0	13 4	12 0	10 10	10 0	9 2	8 6	8 0
45 "	33 9	27 0	22 6	19 3	16 10	15 0	13 6	12 3	11 3	10 4	9 8	9 0
50 "	37 6	30 0	25 0	21 5	18 9	16 8	15 0	13 8	12 6	11 6	10 9	10 0

EXAMPLES.—An 8-inch focus lens, at a distance of 35 feet, will give a disc of 13 feet 1 inch. To produce a disc of 12 feet, with a lens of 10 inches focus, the lantern and screen must be separated by 40 feet. To produce a disc of 15 feet at a distance of 45 feet will require a lens of 9 inches focus.

CONVERSION OF FRENCH INTO ENGLISH MEASURES.

1 cubic centimeter	=	17	minims						
2 cubic centimeters	=	34	"						
3 "	=	51	"						
4 "	=	68	"	or 1	drachm	8	minims.		
5 "	=	85	"	" 1	"	25	"		
6 "	=	102	"	" 1	"	42	"		
7 "	=	119	"	" 1	"	59	"		
8 "	=	136	"	" 2	drachms	16	"		
9 "	=	153	"	" 2	"	33	"		
10 "	=	170	"	" 2	"	50	"		
20 "	=	340	"	" 5	"	40	"		
30 "	=	510	"	" 1	ounce	0	drachm	30	minims.
40 "	=	680	"	" 1	"	3	drachms	20	"
50 "	=	850	"	" 1	"	6	"	10	"
60 "	=	1020	"	" 2	ounces	1	"	0	"
70 "	=	1190	"	" 2	"	3	"	50	"
80 "	=	1360	"	" 2	"	6	"	40	"
90 "	=	1530	"	" 3	"	1	"	30	"
100 "	=	1700	"	" 3	"	4	"	20	"

THE CONVERSION OF FRENCH INTO ENGLISH WEIGHTS.

1 gramme	=	$15\frac{2}{5}$	grains.					
2 grammes	=	$30\frac{4}{5}$	"					
3 "	=	$46\frac{1}{5}$	"					
4 "	=	$61\frac{3}{5}$	"	...... or	1	drachm	$1\frac{3}{5}$	grain.
5 "	=	77	"	...... "	1	"	17	grains.
6 "	=	$92\frac{2}{5}$	"	...... "	1	"	$32\frac{2}{5}$	"
7 "	=	$107\frac{4}{5}$	"	...... "	1	"	$47\frac{4}{5}$	"
8 "	=	$123\frac{1}{5}$	"	...... "	2	drachms	$3\frac{1}{5}$	"
9 "	=	$138\frac{3}{5}$	"	...... "	2	"	$18\frac{3}{5}$	"
10 "	=	154	"	...... "	2	"	34	"
11 "	=	$169\frac{2}{5}$	"	...... "	2	"	$49\frac{2}{5}$	"
12 "	=	$184\frac{4}{5}$	"	...... "	3	"	$4\frac{4}{5}$	"
13 "	=	$200\frac{1}{5}$	"	...... "	3	"	$20\frac{1}{5}$	"
14 "	=	$215\frac{3}{5}$	"	...... "	3	"	$35\frac{3}{5}$	"
15 "	=	231	"	...... "	3	"	51	"
16 "	=	$246\frac{2}{5}$	"	...... "	4	"	$6\frac{2}{5}$	"
17 "	=	$261\frac{4}{5}$	"	...... "	4	"	$21\frac{4}{5}$	"
18 "	=	$277\frac{1}{5}$	"	...... "	4	"	$37\frac{1}{5}$	"
19 "	=	$292\frac{3}{5}$	"	..... "	4	"	$52\frac{3}{5}$	"
20 "	=	308	"	...... "	5	"	8	"
30 "	=	462	"	...... "	7	"	42	"
40 "	=	616	"	...... "	10	"	16	"
50 "	=	770	"	...... "	12	"	50	"
60 "	=	924	"	...... "	15	"	24	"
70 "	=	1078	"	...... "	17	"	58	"
80 "	=	1232	"	...... "	20	"	32	"
90 "	=	1386	"	...... "	23	"	6	"
100 "	=	1540	"	...... "	25	"	40	"

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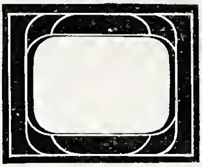
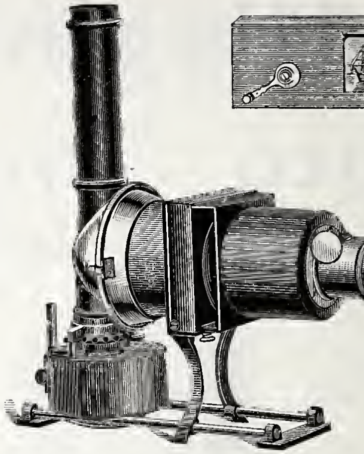

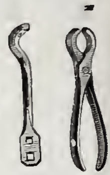
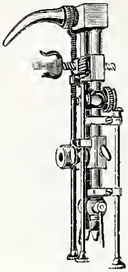
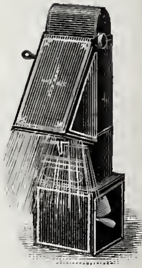

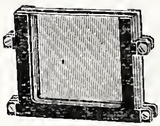
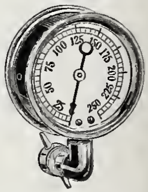
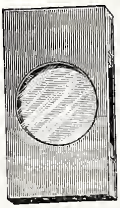
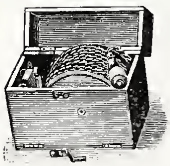
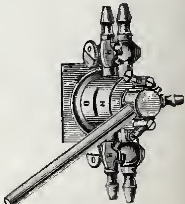
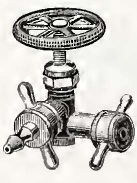
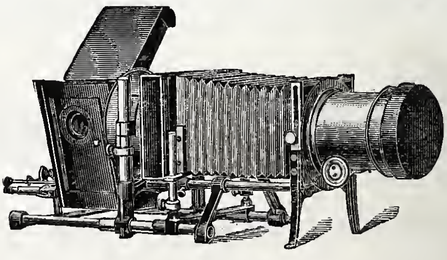
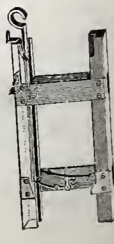

To Users of our Papers...

On account of the fact that our retail price list is 20 per cent. lower than some manufacturers a number of dealers are trying to substitute other brands in their orders, informing customers that we are out of business, had a fire, and not making any more.

Our place was destroyed upon the 7th of May, '94, but one week thereafter we had a new place equipped (until we could rebuild) and supplied all our trade in a satisfactory manner.

The fact that we were without a home for a short time was used to our detriment, but from the number of orders we received direct from consumers we think the rather lame excuse of our Omega and other papers not being in stock was readily understood and the "stickers" failed to inflict as much loss as expected.

Parties desiring to Use our Papers

Whether in dozen or gross packages, we will be pleased to be favored with their orders, and when money accompanies order we will pay postage or express on all packages ; in fact we would request that money be sent with all orders, unless New York references can be given, and the order is large enough to warrant making a charge.

We will guarantee all and every sheet sent out to be perfect, and will make good any defects. We find that in charging small bills that the expense and bother of collecting takes a large amount of profit, and goods sent C. O. D. are frequently as much loss; as, if party does not accept them at once, they soon are spoilt by age and the damp places in which they are stored ; and when returned to me are unfit to be used even as seconds.

To Dealers...

Who are not in the combine and think it would be to their interest to sell a cheaper paper we would be pleased to enter into correspondence and give prices. It sometimes pays to be different to others. Think it over.

C. E. HOPKINS, Mfr.

300 and 302 52d St. BROOKLYN, N. Y.

Omega Paper, Murdock Phenomenal Paper,
Peerless Blue Paper, Omega Toning Solution.

Combined Toning Solution

Ready for immediate use.
10 oz. bottle, 30c.; 16 oz. bottle, 50c.
Packed for shipment to dealers in cases of 25, 50, 100.

FOR AMATEURS

Or those using a prepared combined bath this is offered as being as regular as can be manufactured. When care is taken and not too many prints are toned with one lot, satisfactory prints are produced in every instance. **Notice the price. Compare with others.** If your dealer will not keep it for you notify us.

We are the first to manufacture a combined bath.

There are others which your dealer will say are just as good, but if you have used ours and you can not seem to get your regular dealer to supply you, let us know and we will inform you how it can be obtained at no increased cost to you.

Remember that our

OMEGA (Gelatine)
MURDOCK (Collodion)
PEERLESS BLUE PAPER

is the same price per package. The first two have 12 sheets in each package, the blue 25, but the packages are the same price.

C. E. HOPKINS, Mfr.

300 and 302 52d St. **BROOKLYN, N. Y.**

Omega Paper, Murdock Phenomenal Paper,
Peerless Blue Paper, Omega Toning Solution.

Peerless Blue Paper...

Carefully assorted and selected

PRICE LIST

TWENTY-FIVE SHEETS IN A PACKAGE

3¼ x 4¼ . . .	per package, $0.15	5 x 8 . . .	per package, $0.40
4 x 5 . . .	" .20	6½ x 8½ . . .	" .60
4¼ x 6½ . . .	" .30	8 x 10 . . .	" .75
5 x 7 . . .	" .35	20 x 24 . . .	" 4.00

WITH FULL DIRECTIONS

It is well known the trouble experienced in obtaining a blue paper that will keep with good results. We ask you to give this paper a trial. Sample packages sent upon receipt of price.

Murdock Phenomenal Paper...

For Professional work

To those using a Collodion Paper we would say : Try It !

For the time this has been upon the market its success has been most "Phenomenal." Knowing the failures of the first manufacturers of this class of paper, we have benefited by their experience and profited thereby.

Excessive Curling we have done away with. A boon to users of papers which need clamps to hold the edges out when in the wash water. **A cold tone may be obtained.**

Sample dozen, Cabinet size, with print, sent upon receipt of 25c.

Prices same as Omega in all sizes. Cabinet, gross, $1.75.

C. E. HOPKINS, Mfr.

300 and 302 52d St. BROOKLYN, N. Y.

Standard Developing AND Toning Solutions.

Hydroquinone Developer,	per 8 oz. bottle,	$0.30
" "	" 16 oz. "	.55
E. A. New Economical Developer,	" 8 oz. "	.40
Ferrous Oxalate Developer,	" package (2 bottles),	.50
Cooper's Concentrated Developer,	" 8 oz. bottle,	.50
Stanley Concentrated Pyro Developer,	two bottles,	.50
Climax Developer,	8 oz. bottle,	.30
" "	16 oz. "	.55
Eikonogen "	8 oz. "	.30
" "	16 oz. "	.55
Concentrated Hydroquinone,	2 oz. "	.30
Acid Sulphite of Soda,	per pint,	.40
Aristotone,	8 oz. bottle,	.40
E. A. Aristotype Toning and Fixing Solution	8 oz. "	.40
Compound Toning Tablets,	24 in "	.25
Compound Toning Powders,	12 in box,	.15
" " "	24 " "	.25
" " "	48 " "	.40
Albutone,	8 oz. bottle,	.40

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STANDARD SOLUTIONS.

Horgan, Robey & Co.

Professional and Amateur Outfitters

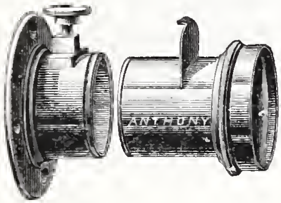
Dealers in Lenses, Cameras, Plates, Paper, Mounts, etc.
Full line of all the leading Hand Cameras in stock.

34 Bromfield Street, Boston, Mass.

E. A. RAPID LENS

(HEMISPHERICAL.)

Lens ready for use.



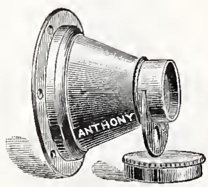
Showing how the central stops or diaphragms are inserted.

HAS a double achromatic combination for making instantaneous views, portraits, groups, etc. The lens should be focused with the full opening.

Price, No. 1, for 4 x 5 pictures,	- - - - - - -	$13.50
" No. 2, for 5 x 8 "	- - - - - -	20.00
" No. 3, for 8 x 10 "	- - - - - - .	30.00

The No. 1 is supplied in rigid mounting.

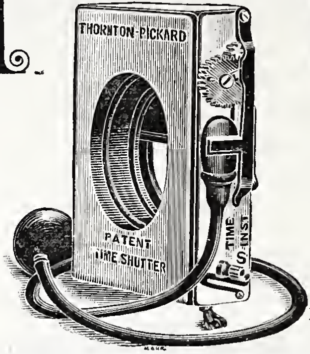
E. A. SINGLE LENS.



4 x 5, - - - - - - - - - - -	$3.75
5 x 8, - - - - - - - - - - - -	4.50
6½ x 8½, - - - - - - - - - -	7.00
8 x 10, - - - - - - . - -	7.00

For Sale by all Photographic Stock Dealers.

THORNTON-PICKARD



TIME

And Instantaneous

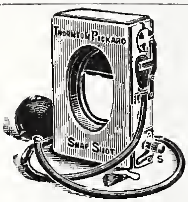
SHUTTER

(*Standard Pattern.*)

Speed up from 1-90 of a second. Price from **$6.50.**
Speed Indicator, **$1.25** extra.
For general all-round work we recommend this pattern.

This Shutter is made upon the curtain principle, and is both theoretically and practically the most efficient in the market.

The Shutter is set for exposure by pulling the cord and released by squeezing the ball. By simply moving the lever the Shutter will give either an "Instantaneous" or a prolonged "Time" exposure. The duration of the "Instantaneous" exposure is shown in fractions of a second on the dial of the Speed Indicator, which is fitted for a small extra charge. For "Time" exposures the Shutter can be held open as long as the ball is squeezed, and closed the instant it is released. Thus the operator has perfect control over the exposure. There is absolutely no vibration in working with this Shutter. It gives exposures of any duration from fractions of a second up to minutes or hours, and is therefore suitable for all kinds of work. It fits on the lens, and the same Shutter can be used on two or more lenses of different sizes. The Thornton-Pickard Shutter has the largest sale in the world. Catalogue, giving fuller particulars, prices, and testimonials, sent free.



The Thornton-Pickard SNAP SHOT SHUTTER

Speed from 1-90 of a second. Price from **$3.50.**
Speed Indicator, **$1.25** extra.

This is an Instantaneous Shutter on the curtain principle, and is suitable for all kinds of Snap Shot work. It is absolutely free from vibration when working. The same shutter will fit two or more lenses. Catalogue free.

The Thornton-Pickard FOCAL PLANE SHUTTER

With Patent Adjustable Slit.

Range of Speed from 1-20 to 1-1000 of a second.
Price from **$12.50.** Speed Indicator, **$1.25** extra.

This Shutter is also made upon the curtain principle, and fits at the back of the camera. The slit in the curtain therefore passes rapidly in front of and close to the sensitive plate. This Shutter is specially useful for subjects in very rapid motion and requiring a very high speed. It gives a shorter exposure and passes a larger percentage of light than any other form. Catalogue free.

THE THORNTON-PICKARD MANUFACTURING CO.

2 Park Square, **BOSTON,** Mass.

And Altrincham, Near Manchester, England.

The Platinotype

(Cold Bath)

SIMPLEST AND BEST

Send for Illustrated Pamphlet

to

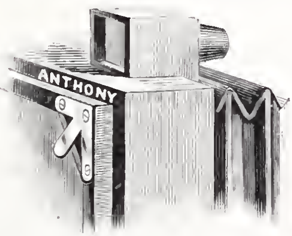
WILLIS & CLEMENTS

1624 CHESTNUT STREET

PHILADELPHIA

Anthony's Universal Finder.

Showing method of fastening Finder to Camera.



Showing Finder on Camera.

THIS is a neat, compact article that can instantly be attached to any camera, and is of great value in composing a view. The object to be photographed being plainly visible and occupying the same relative position as on the ground glass or plate, it is indispensable for instantaneous views of moving objects. It corresponds in shape to the ordinary negative. The ground side of the glass can be marked at will to denote position desired when taking instantaneous views.

PRICE, - - - - - - - - - - $1.50.

FOR SALE BY ALL PHOTOGRAPHIC DEALERS

PRICE LIST OF PERFECTED ENGRAVED GRATINGS

MANUFACTURED BY

MAX LEVY, 1213 RACE STREET PHILADELPHIA, PA., U. S. A.

CROSS LINE SCREENS

* Sizes in inches	LINES PER INCH						
	75, 80 or 85	100	110 or 120	125 or 133	140 or 150	166 or 172	200
6 x 8	$ 15.00	$ 18.00	$ 20.00	$ 22.00	$ 26.00	$32.00	$ 40.00
6½ x 8½	18 00	20 00	24.00	28.00	32.00	40.00	50 00
7 x 9	24.00	25.00	30.00	36.00	42.00	50.00	65.00
8 x 10	32.00	35.00	42.00	48.00	54.00	68.00	82.00
9 x 11	35.00	40.00	55.00	60.00	70.00	85.00	100.00
10 x 12	40.00	52.00	72.00	80.00	95.00	110.00	130.00
11 x 14	60.00	80.00	100.00	115.00	135.00	150.00	180 00
12 x 15	80.00	105.00	135.00	148.00	180.00	200.00	235.00
13 x 16	100 00	130.00	166.00	188.00	210.00	245.00	300.00
14 x 17	125.00	165.00	200.00	230.00	275.00	300.00	375.00
15 x 18	160.00	200.00	240.00	275.00	330.00	375.00	
16 x 20	190.00	240.00	280.00	330.00	375.00		
17 x 21	230.00	285.00	330.00	375.00			
18 x 22	275 00	325.00	385.00				

Quotations on larger sizes, up to 32 x 38 inches, will be furnished on demand.

For **SINGLE RULINGS** deduct 33⅓ per cent.

Plates of other sizes will be charged in proportion to the above list in superficial area.

TRIAL SIZES, AND ALL SIZES UP TO 5 x 8

Sizes	All rulings up to 133	140 or 150	166 or 175	200
3¼ x 4¼	$ 2.00	$ 3.00	$ 5.00	$ 8.00
4 x 5	4.00	6.00	8.00	12.00
4¼ x 6½	6.00	8.00	10.00	16.00
5 x 7	12.00	14.00	18.00	22.00
5 x 8	14.00	17.00	22.00	32.00

NOTE

These sizes are not usually cut exact as marked; they are about ¼ inch larger each way, unless ordered of specific size.

* These dimensions give the largest picture that can be conveniently made. The outside measure of plates is from one-half inch larger on the smaller sizes to three-quarters of an inch on the larger size plates.

PRICES STRICTLY NET CASH

NEW HOUSE
FRESH GOODS
LOW PRICES

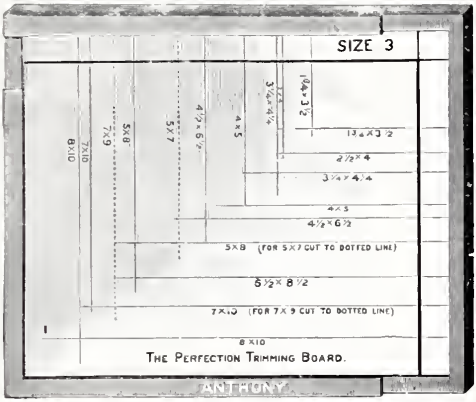
STEPHEN B. BUTTS
JOHN F. ADAMS

BUTTS & ADAMS
PHOTOGRAPHIC SUPPLIES

457 AND 459 WASHINGTON ST.
BUFFALO, N. Y.

CONVENIENT DARK ROOM FOR AMATEURS

TRIM YOUR PRINTS



— WITH —

The Perfection Trimming Board

One Glass Pattern Suffices for all Sizes. No Measuring or Marking Necessary.

PRICES

Up to 4 x 5,	$1.00
5 x 8,	1.25
8 x 10	1.50

For Sale by all Photographic Stock Dealers, and by E. & H. T. ANTHONY & CO.

ANY PHOTOGRAPHIC PUBLICATION

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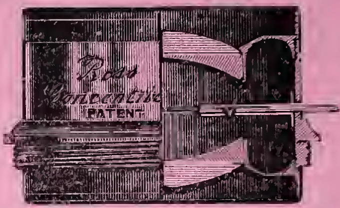
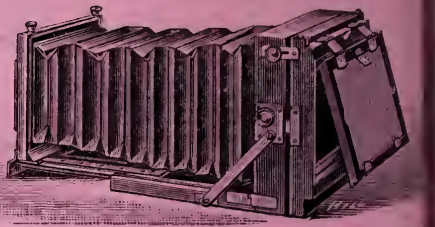
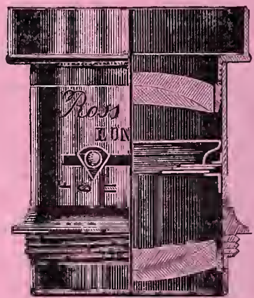
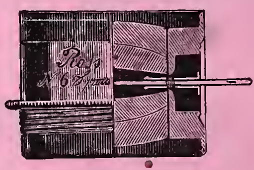
E. & H. T. Anthony & Co.

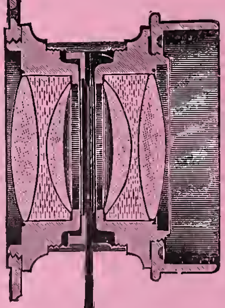
Send for Revised List ......

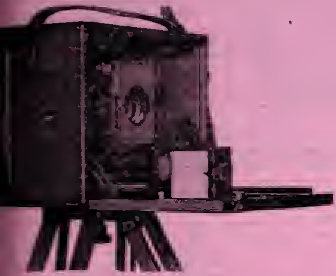

PATENT

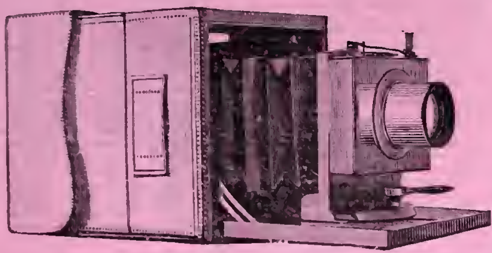


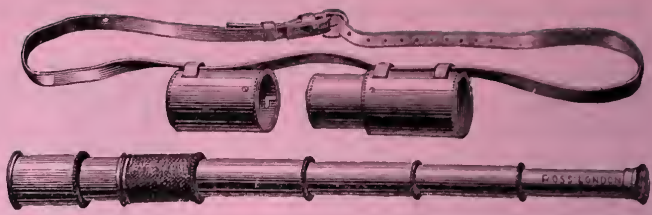








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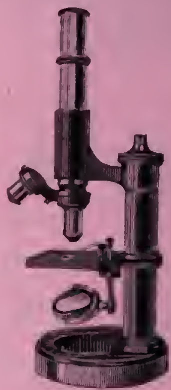
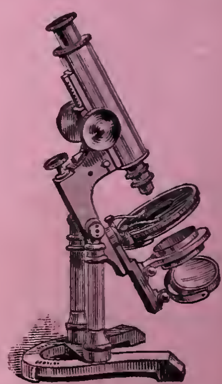




Our Only Business

Is to supply all the goods required by photographers.

Our Success

In doing this is so marked that we are sure our methods and prices are just what the trade want. We can supply a few more in the same satisfactory manner.

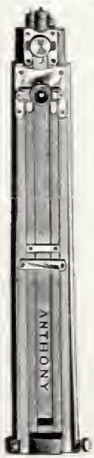
Send orders to

W. D. GATCHEL, Agent,
343 W. Jefferson St.,
LOUISVILLE, KY.

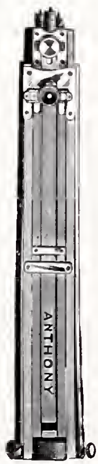
or

A. B. GATCHEL, Manager,
214 N. Twenty-first St.,
BIRMINGHAM, ALA.

TRIPODS.



E. A. Improved Folding,	$2.25
E. A. Telescopic,	4.50
Climax,	3.50
Triplex,	4.00
Fairy,	5.00
Umbrella,	4.00
Phantom,	5.00



PORTABLE. RIGID. COMPACT.

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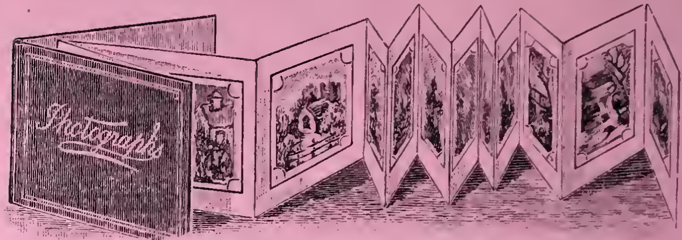
PERCY LUND & CO.'S PANORAMIC ALBUMS



The Antique Panoramic Series for Unmounted Prints

A superior quality. Hand-made, old style cardboard leaves, with plain chocolate line. Very artistic in appearance.

¼ plate 1/0 ½ plate 1/6 Whole plate 2/0

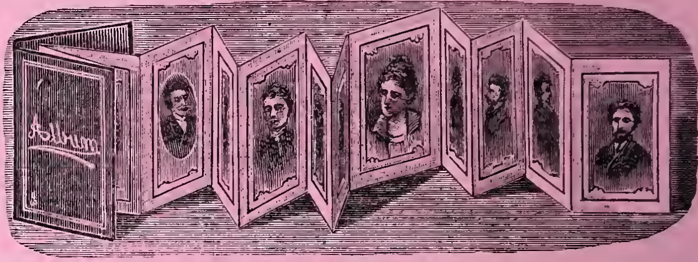
The Panoramic Series for Mounted Prints

Professional photographers will find a large demand for these if shown to their customers.

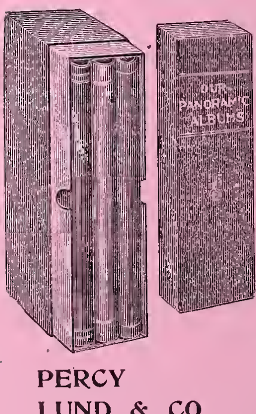
To hold 12 C.-de-V.'s	1/0	To hold 12 ¼ plate	1/0
" 12 Cabinets	1/6	" 12 ½ "	1/6

Can be used for carrying selected photographs in the pocket, as a screen for the mantel-piece, or for an ordinary table album. The above are far neater and more artistic than the majority of portrait albums which sell at 5/0 or 6/0. They are strong and durable, and will last for years if the slits are not bent back. The photographs should be carefully inserted from the side, and not from top or bottom.

"These are attractive novelties which should at once commend themselves to the popular taste."—*Publishers' Circular.*



Open as a Screen.



A Novelty in Panoramic Albums for Mounted Photographs

Three Panoramic Albums in elegant cardboard box. Each album will hold 12 cabinets or 24 c.-de-v.'s respectively, each page being ingeniously arranged so as to admit of either two c.-de-v.'s or one cabinet, according to choice, an advantage in which the Panoramic Album is unique.

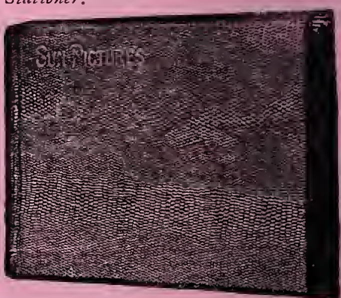
The Albums are respectively lettered in real gold on front—
OUR FAMILY OUR RELATIONS OUR FRIENDS

Price for the set of three: Cloth, 4/6; Leather, extra gilt, 7/6

"Far and away ahead of anything in the album line, while the very novelty of the idea will almost sell it at sight."—*British and Colonial Printer and Stationer.*

"Sun Pictures" Album

Cacacity — 200 ¼ plates, 50 ½ plates, or 50 1-1 plates. No mounting, all done by an ingenious arrangement of slits. Snakeskin leather, gilt edges; the finest album of its class made. 10/6 each.

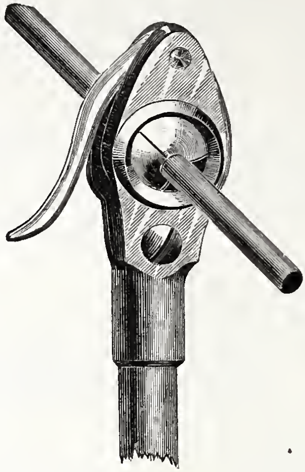


PERCY
LUND & CO.

The Country Press, Bradford
Memorial Hall, London, E.C.

WHITE'S Requisites in Posing and Lighting for the Studio.

Whites Patents



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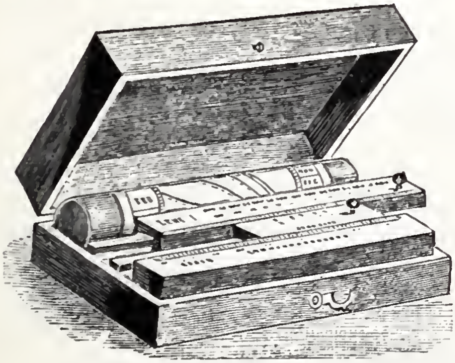

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