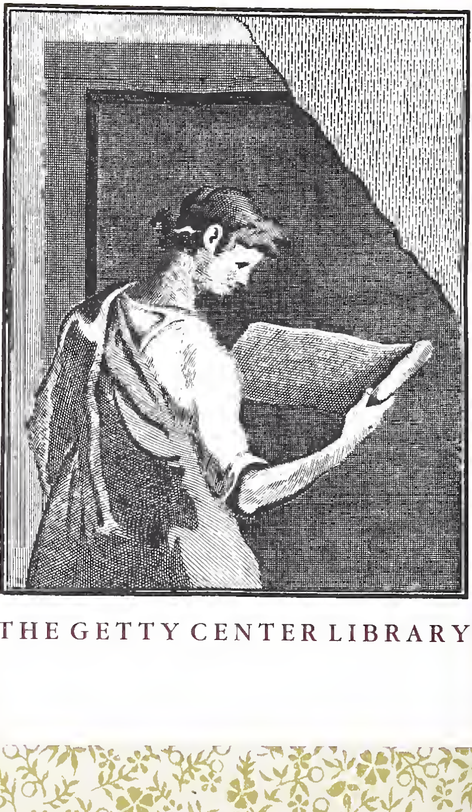
The American Annual of Photography

1916



ANSCO POCKET PHOTOGRAPHY— THE MISSING LINK

IT IS not always convenient to carry the usual size of folding camera, but an Ansco Vest-Pocket is so flat, so small, that it can be slipped into a coat, vest or hip pocket where it can be reached at a moment's notice. It is the smallest camera on the market made to take $2\frac{1}{4} \times 3\frac{1}{4}$ pictures.

The whole scope of pocket photography is embraced in the Ansco Vest-Pocket series, consisting of two models and several lens and shutter equipments, designated by the name given to each different camera.

The Ansco Vest-Pocket does not take the place, but supplements the larger instruments. It is the missing link—as it were.

In addition to its portability it widens the possibilities of photography.

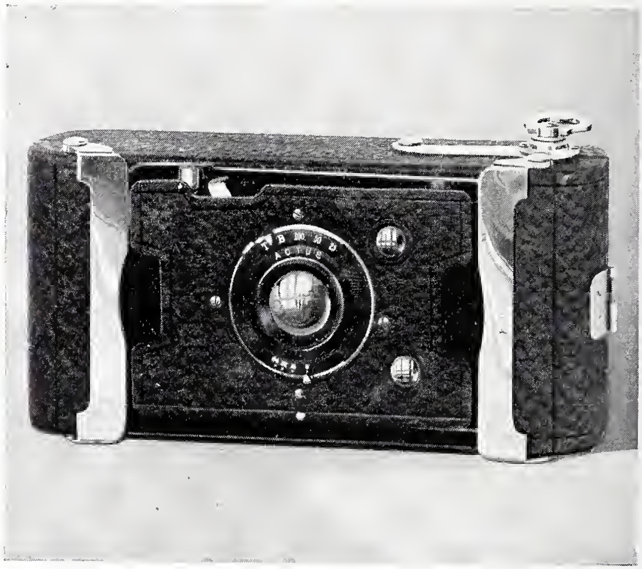
A lens, to cover a plate or film $2\frac{1}{4} \times 3\frac{1}{4}$ admits of a comparatively short focal distance, and may be constructed so as to possess apparently greater depth of focus, hence capable of universal distance range with a larger aperture than lenses intended for pictures of greater dimensions.

When the lens and shutter equipment is a high-grade Anastigmat working at F 6.3 or F 4.8 and shutter with a maximum rapidity of 1/300 second, if the camera be used with extra-fast ANSCO SPEEDEX FILM, the picture may be taken almost anywhere in any light, provided the directions accompanying each camera are carefully followed.

This great anastigmat advantage means that snapshots can be made on dull, cloudy or rainy days, or late in the afternoon, and that rapidly moving objects can be successfully photographed. It means that the picture is taken where the picture is, without posing or selecting a properly lighted spot.

The negatives generally are so clear and sharp that enlarged prints up to 11x14 inches may be made from them on ENLARGING CYKO, which will be more pleasing than direct pictures made with an 11x14 camera.

The following pages contain detailed specifications, prices and illustrations of the Ansco Vest-Pocket series.



ANSCO VEST-POCKET No. 1

Single Achromatic Lens $7.50
Rapid Rectilinear Lens 9.00

SPECIFICATIONS

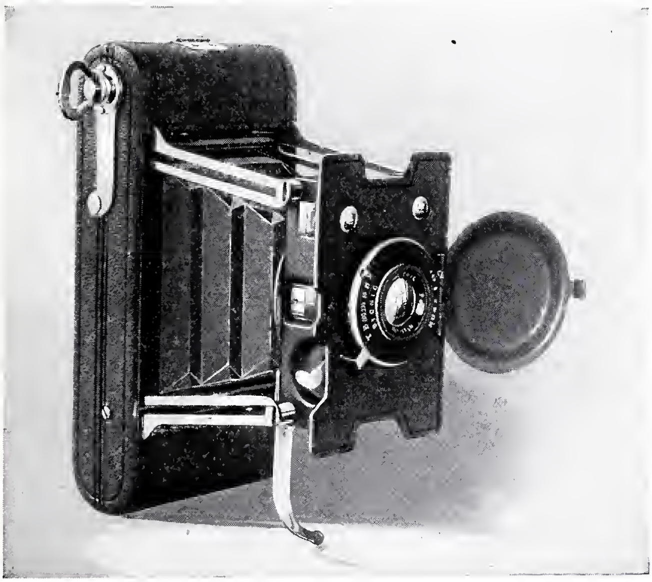
Size of camera	1¼ x 2⅞ x 6 inches
Weight	12 ounces
Size of picture	2¼ x 3¼ inches
Size of film	4A Ansco

Focus, fixed.
Trimmings, nickelplated.
Covering, morocco leather.
Frame, aluminum throughout.
Brilliant View Finders.

Price complete with S. A. lens and Actus self-acting shutter	$7.50
Price complete with R. R. lens and Actus self-acting shutter	9.00

EXTRAS

Sole Leather Holster with belt strap	$1.50
Carrying Case with shoulder strap	1.00
Six-Exposure Film (4A)	.20



ANSCO VEST-POCKET No. 2

Modico Anastigmat Lens F 7.5 $15.00
Ansco Anastigmat Lens F 6.3 25.00

SPECIFICATIONS

Size of camera	1¼ x 2⅞ x 6 inches
Weight	12½ ounces
Size of picture	2¼ x 3¼ inches
Size of film	4A Ansco
Focal length of lens	3½ inches

Micrometer focusing device.
Trimmings, nickelplated.
Covering, morocco leather.
Frame, aluminum throughout.
Brilliant View Finders.

Price, complete with Modico Anastigmat Lens F 7.5 and Extraspeed Bionic Shutter (maximum 1/200 second)	$15.00
Price, complete with Ansco Anastigmat Lens F 6.3 and Extraspeed Bionic Shutter (maximum 1/200 second)	25.00

EXTRAS

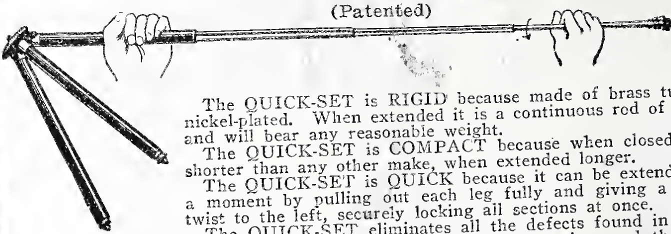
Sole Leather Holster with belt strap	$1.50
Carrying Case with shoulder strap	1.00
Six-Exposure Film (4A)	.20

THE QUICK-SET METAL TRIPOD

NICKEL-PLATED

Embodying all the Features of a Good Tripod
RIGID When Extended
COMPACT When Closed
QUICK When Operated

(Patented)



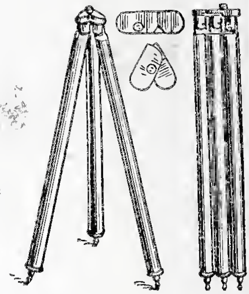
The QUICK-SET is RIGID because made of brass tubing, nickel-plated. When extended it is a continuous rod of metal and will bear any reasonable weight.

The QUICK-SET is COMPACT because when closed it is shorter than any other make, when extended longer.

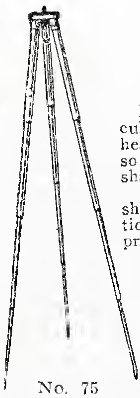
The QUICK-SET is QUICK because it can be extended in a moment by pulling out each leg fully and giving a short twist to the left, securely locking all sections at once.

The QUICK-SET eliminates all the defects found in other makes of tripods. It has no buttons or pins, and the legs cannot become loosened.

The QUICK-SET TRIPOD, where fastened to the head, is reinforced by a pinion, making it absolutely unbreakable. However, in case of accident any section of the legs can readily be replaced at slight expense. Again, the QUICK-SET does away with the objectionable buttons and springs used on other makes of metal tripods. It has no projecting parts, and the lock is so constructed that it is impossible to slip or unlock under pressure. Another feature of superiority over other metal tripods is the adjustable one; can be locked at any section, thereby shortening it, if needed.



No. 60



No. 75

Nos. 51 to 53, inclusive, are made with the legs fastened to a circular head 1¾ inches in diameter. No. 60 lies perfectly flat; the head being a flat piece of metal ¾-inch wide, 2½ inches long; it is so made as to fold over, when extended, and form a broad triangular-shaped head.

The No. 75 is constructed with a loose tripod screw, with a long shank, making it very easy to turn the camera in any desired direction, and then clamp firmly. The top is covered with green felt, to prevent marring the camera.

No.	Sections	Length Extended Inches	Length Closed Inches	Weight Ounces	Price
51	3	39½	15	13½	$2.00
52	3	45	16½	14½	2.10
53	4	48½	14	19	3.00
60	5	50	12	21	4.50
75	4	50½	15	25	4.50

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NOSLIP PRINTING MASK

(PATENTED)

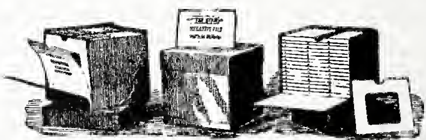
For Printing Film Negatives

The Noslip Printing Mask is the latest improvement in printing masks. It does away entirely with the slipping of the negative when placing the paper in position in the printing frame which frequently occurs with all of the old-style masks. It does away with all bad and ill-shaped edges, leaving a neat even white border all around the print. This mask has pockets in the four corners into which the film is slipped. Full directions with each set of masks. Each set consists of three masks, one for postcards and one each with oval and square opening the size of the negative film.

PRICES

No. 1.	For 2¼x3¼	Film Negative, per set	$0.50	Postpaid
" 2.	" 2½x4¼	" " " "	.50	"
" 3.	" 3¼x4¼	" " " "	.50	"
" 4.	" 3¼x5½	" " " "	.50	"
" 5.	" 4 x5	" " " "	.50	"

If You Use the Star Negative File



(Patented July 16, 1900)

you can instantly locate any negative desired. This file provides a perfect means of storing and indexing negatives. It is a heavy pasteboard box covered in imitation morocco, fitted for 50 glass negatives, or a larger number of films, separated by pasteboard frames. An index is in front of each file.

3¼x 4¼		$0.30	Postpaid
4 x 5		.37	"
5 x 7		.48	"
6½x 8½		.65	"
8 x10		.72	"
3¼x 4	For lantern Slides	.30	"

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ARTURA IRIS
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The American Annual of Photography 1916

VOLUME XXX

Edited by Percy Y. Howe

NEW YORK
THE AMERICAN ANNUAL OF PHOTOGRAPHY, INC.
MCMXV

[TRADE MARK REGISTERED]

Federal Printing Co., New York

PREFACE.

OUR present volume is largely the result of American workers, as the war which is now raging in Europe has greatly interfered with our usual foreign contributions.

We sincerely trust that before we complete our next volume the entire world will once more be at peace.

While the war in some sections has stimulated the photographic industry, the general effect has been very demoralizing, due to the present stagnation of business, and the extremely high prices for photographic chemicals and other materials manufactured abroad.

To those who have aided in any way in the making of this book I wish to express my sincere thanks.

As usual, I have been compelled to omit both literary and pictorial work of merit through lack of space.

We invite contributions to our next volume, either by manuscript telling of some experience or process in photographic work, or by prints for illustration. These should reach us before August 15th, 1916, at the address given below.

Percy Y. Howe, Editor.

422 Park Hill Ave., Yonkers, N. Y.

TABLE OF CONTENTS

Contributed Articles

Index to Subjects

Index To Authors

Index to Illustrators

Index to Illustrators—Continued

Index to Advertisers

REFERENCE CALENDAR FOR THREE YEARS

1915

	S	M	T	W	T	F	S
Jan.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
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A MAY MORNING ON THE GRASSY SPRAIN. Rudolf Eickemeyer.

The American Annual of Photography · · 1916

THE KODACHROME PROCESS OF COLOR PORTRAITURE

By DR. C. E. KENNETH MEES

IN addition to one or two processes which are only of laboratory interest all methods of color photography consist of applications of the three color theory of vision, depending on the fact that any color can be matched by a combination in the proper proportions of the three primary colors —red, green and blue-violet. There are two main methods by which the combination of those colors can be achieved and a color picture produced, these being termed respectively the additive and subtractive methods.

The original process used by Clark Maxwell in his famous lecture at The Royal Institution in 1861 was an additive process, for he projected on a screen three lantern slides made from three negatives taken of a colored ribbon by means of three lanterns in front of which were glass troughs, these containing respectively, sulpho-cyanide of iron, which is red; chloride of copper, which is green; and ammonio-copper sulphate, which is blue-violet in color. The three negatives from which the lantern slides were made had already been taken through the same three solutions. The lantern slide taken by red light was projected by red light, that from the negative taken by green light was projected by green light, and that taken by blue light was projected by blue light, the three pictures being superposed on one another, so that a colored image was seen on the screen, of which the report says: "If the red and green images had been as fully photographed as the blue, it would have been a truly colored image of the ribbon." This imperfection of Maxwell's result was undoubtedly due to his lack of photographic material appreciably sensitive to any colors other than blue-violet.

Since this first experiment the additive process of three-color projection has been used by many workers, the best known being Ives in his famous "Kromskop," which he modified so that the principle could be used both for projection on a screen and also as a viewing instrument to be used by an individual observer.

One of the latest applications has been the Gaumont three-color process, where three cinematograph pictures are taken on film of the usual width, one above the other, through three lenses, the pictures being somewhat reduced in height so that the three pictures are two and a quarter times the length of the ordinary black and white picture, the film being moved after each exposure through the length of the three pictures. Projection is accomplished by means of a very ingenious triple lens, each positive being projected through its own lens system and filter, and registration effected by moving two of the lenses.

An entirely different application of the additive process of color photography is found in the screen plates, of which the best known example is the Lumiere autochrome plate. The possibility of this method was first indicated by Ducos du Hauron in 1869 in the little booklet entitled "La Photographie des Couleurs," in which he outlined many of the processes of color photography which have since been realized in practice.

The principle of the screen plate process is to divide the surface of the plate into a number of microscopic filter units—red, green and blue-violet—and then to take the picture through these units upon an emulsion from which a positive is made either by reversal or by the ordinary photographic methods, this positive being registered with the screen, so that where the emulsion was blackened by exposure through one of the filter units, light is transmitted through that unit in the finished picture. Suppose, for example, that a red object is photographed on a screen plate. Then, where the image of the red object falls, light will pass through the red filter units and will affect the emulsion beneath so that it

PORTRAIT. HELMAR LERSKI.

will be blackened after development, while where the emulsion was protected from the red light by the green and blue units which absorb it no effect will be produced. Now, if the developed negative be converted into a positive, the portions of it under the red filter units will be transparent, while those under the green and blue filter units will be opaque, so that on viewing the picture the red object will be represented only by the red filter units, the other units being blocked out, and will consequently appear red. The Lumiere Autochrome plate represents this process in its simplest form, the filter screen being coated upon glass and the emulsion on top of the screen, while the negative itself is reversed and converted into a positive so that it remains always registered with regard to the screen.

These additive processes of color photography, however, have some disadvantages; the projection system, while admirable for the illustration of lectures, is inconvenient for any other purpose, while the screen plates by virtue of the presence of the filter screen are necessarily dark, and the introduction of the filter screen introduces limitations as to definition and quality which are not altogether desirable, so that the subtractive processes, although on the whole they are more difficult to work than the additive, have always been considered as offering many attractions.

The subtractive processes depend upon the generation of colors upon the superposition of the three complementary colors—blue-green, magenta and yellow. Where magenta is superposed by yellow we get primary red, the yellow absorbing the blue and the magenta the green light, so that only the red constituent of white light is left. Where blue-green is superposed upon yellow we get green, the blue constituent being absorbed by the yellow and the red by the blue-green, and where magenta is superposed upon blue-green we get blue-violet, the red being absorbed by the blue-green and the green by the magenta. Consequently, by superposing the three in the requisite proportions, all colors can be reproduced.

The method adopted in practice is to make three negatives through the three color filters just as in the additive process, and then to print positives from these negatives in such a way that the image consists of a colored dye, the commonest method

THE MYSTERIOUS CITY.

HASWELL C. JEFFERY.

being to print the negatives in bichromated gelatine. Gelatine containing bichromate and exposed to light becomes insoluble in hot water where the light has acted upon it. Consequently, if a piece of paper coated with gelatine containing bichromate is exposed under a negative and then the film of gelatine is transferred onto another piece of paper or a piece of glass and the back of it washed with hot water, the gelatine will be left in its full thickness where the light has acted strongly and has penetrated right through to the back of the film, but where the light has not penetrated completely through the film, the gelatine will be washed away, so that its thickness will be in proportion to the extent of the light penetration; that is, it will be a complete positive printed from the negative. This film of clear gelatine will, of course, be almost invisible when dried, but by immersing it in a dye solution, the dye will take in proportion to the amount of gelatine, and a color positive will result. The three negatives are printed by this process, the negative taken through the red filter being printed on gelatine which is dyed blue-green, the one through the green filter on gelatine dyed magenta, and the one through the blue filter on gelatine that is dyed yellow. When the three colored transparencies are cemented together on the top of one another, the result completely reproduces the colors of the original object. This transparency may be viewed in the hand or examined in front of an artificial light or projected in a lantern, or instead of this a paper print may be made by stripping off the three gelatine reliefs onto paper; and some very beautiful results have been obtained in this way. The only objection to this process is that it is not at all easy to work. The making of the three negatives itself offers no difficulties, but the printing and dyeing of the gelatine reliefs, so as to get them printed alike and developed to the same extent, has made the process too intricate to be a commercial success.

Obviously one step in simplification would be the substitution of two colors for three. This has already been done in the Kinemacolor process of color cinematography, where two negatives are used—a red and a green—and positives from these are projected alternately upon the screen, through red and green filters. The color rendering in this process is quite

BOY WITH HOOP. MATHILDE WEIL.

pleasing, although the correctness is much inferior to that of the three-color process, but the results obtained are sufficiently encouraging to justify the belief that a slight improvement in color rendering over the results obtained by the two-color additive process would be quite satisfactory for many purposes. Now, an investigation of the colors produced by the addition by superposition in projection of two nearly complementary colors has shown that a serious limitation to the range of color which can be produced is imposed by the necessity that the two colors used should be nearly complementary to one another, because the whites are produced by the two colors together in full strength, and unless they are nearly complementary pure whites will not be obtained. On the other hand, in a two-color subtractive process the whites are obtained by the absence of either of the colors, while in the case of full black, the colors are of such strength that almost any color would be satisfactory. Colors can consequently be used which are not exactly complementary, and under these conditions a very much better range of colors can be obtained than is possible with the additive process, so that a two-color subtractive process should theoretically give a color rendering which, while not so good as the three-color process, should be better than the two color additive process and would probably be sufficiently pleasing for most purposes.

Clearly, the simplest possible subtractive process will be one in which the original negatives themselves are directly transformed into color positives; therefore, the simplest possible color process will be one in which two negatives taken under two filters are directly transformed into the partial pictures for the two color process,—the red negative being turned into a green positive and the green negative into a red positive, and the two then superposed face to face to make the completed picture. Such a process would employ no loose films and only the minimum number of glass plates, while there would be no transferring of pictures from one glass to another. The final difficulty of registering, also, is reduced to a minimum. Moreover, if the original negative can actually be transformed into a color positive, we may expect to retain in the positives all the gradation of the original negatives. The gradation by this process should consequently be as good as

A WOODSIDE WEENIE. CLAUD H. SIMSON.

can possibly be obtained. Also, since there is no screen and the high lights are represented by clear unstained gelatine, the transparency of the picture should be equal to that of a black and white subject.

It will be noticed, however, that this proposed method of working involved one very big step which had never yet been solved; namely, the direct transformation of a negative in black silver into a positive in which the silver of the negative was represented by clear gelatine, and the places that were lightest in the negative by a full strength of any colored dye that might be chosen, the transformation being correct throughout, so that all the gradation of the original negative was reproduced in the resulting positive. It was this specific problem of transforming a silver negative into a dye positive, the working out of which made the new Kodachrome two color process possible. Although the solution now appears simple, it involved a great deal of experiment, small changes in the procedure having much influence on the result, so that a satisfactory process was only achieved by continual experiments and changes in working.

The method adopted is to make the negatives on panchromatic plates, and through the correct filters, and then develop them as usual. They are then chemically treated so as to remove the black silver and leave the plate looking just like a colorless sheet of gelatine showing no sign of an image. Then this plate is put into the specially prepared dye bath, the dye goes into the gelatine most easily where the silver was absent in the negative; that is, where there was least light in the original photograph or in the part represented by deep shadows; while in the parts corresponding to the high lights, where there was much silver in the negative, the dye penetrates more slowly, so that as the dye slowly enters the film, the original negative is transformed into a positive produced in a colored dye.

While the one color is made in this way the companion picture is also dyed in the other color, and the two when placed together make the finished picture. The process is thus seen to be simplicity itself, the novel point of it being the method which has been worked out for transforming a black and white negative image into a colored dye positive. Since only two colors are used in the process, it is obvious that all colors cannot be correctly rendered, and the colors for which the process fails are the blues, violets, magentas and purples. Light blues appear blue-greens, and violets, black; magentas appear pink, and purples dark brownish-red. On the other hand, flesh tints of all kinds, and all shades of red, orange or green, grays and blacks are well rendered. As these are predominant in portraits, the results are very satisfying for this class of work. Many of the pictures appear to show blues very well, but this is because by contrast with greens, blue-greens look blue, and especially by artificial light the eye

HILLSIDE SHADOWS. G. P. KIMBERLY.

is accustomed not to expect very much of blues. The failure in color rendering is more obvious by daylight, and because of the importance of greens and blues in most landscapes, the process is not suitable for landscape work. The pictures appear at their best when placed in a special illuminator, giving a much truer color rendering than when viewed by daylight. The results obtained are permanent, the colors being fast both to light and heat.

For the practical working of this process it is necessary to have a powerful light in the studio, and experience has shown that the plates can be best worked by the use of artificial light. For this reason a special electric lighting system for working the process has been designed. A camera may be used by which one of the negatives is made reversed compared with the other one, so that when the two plates are put face to face, they will register, or the pictures may be made in an ordinary camera to which a repeating back has been fitted carrying the two filters and plate holders, so that first one picture can be taken, than the back slid along and the other picture taken at once. This camera enables the two exposures necessary to be given very rapidly one after the other, the total exposure, using the powerful artificial light which has been adopted, being only about three seconds. Great attention to detail is necessary in the process if the best results are to be obtained.

Portraits produced by this process are in the form of transparencies and are intended to be viewed in a special illuminator which lights them evenly from behind by electric light, this illuminator being attachable to any electric light fitting. Finished portraits illuminated in this manner add to the attractiveness of library or sitting room.

The process cannot be used for the production of paper prints, and in most cases it is convenient to transform the original negatives into the finished positive, but, if desired, duplicates can be made by making contact positives from the original negatives, from which new negatives are printed which are then transformed into the color images. This duplication process allows retouching both of the negative and positive to be employed if desired.

The new process is not well adapted to its present form to outdoor subjects, especially where blue sky is included in the picture. The limitation of the process to transparencies must also be remembered. It represents, however, a highly satisfactory and practical method of obtaining beautiful color portraits having first-rate photographic quality and giving a pleasing reproduction of the colors of the original.

AN OLD BRIDGE, VENICE. CESARE L. LUZZATTI.

TEXTURES

By PAUL L. ANDERSON

IT is not my intention to discuss at length the photographic suggestion of the textures of objects, since this is a matter of no great difficulty, requiring merely a corrected lens, a suitable illumination—usually at an angle of 45°—a panchromatic plate with an adjusted filter, and correct exposure and development. It is true that a satisfactory suggestion of texture may often be obtained when one or more of these elements are lacking, but the combination will infallibly give the desired result. However, there is another quality which is designated by the name of texture, and it is this latter which forms the subject of the present article.

It is well known that different printing papers have different qualities of surface, and that painters use various types of canvas and styles of brush stroke, and the question naturally arises, "Why should this be the case? Why not use the same superficial character for all subjects?" The explanation is that the surface of a picture may play an important part in the effect on the spectator, and this is of importance to the pictorial worker, though it is of no consequence to the commercial photographer, beyond the fact that a smooth or glossy surface is best adapted to the rendering of detail.

The fundamental purpose of a picture is to arouse some emotion or sentiment in the observer, by reminding him of something that he has seen. It is not necessary that the picture should represent any place that is familiar to the spectator, or that it should even suggest any place with which he is acquainted, but it is enough if it suggests a type of landscape, illumination, person, group of persons, or the like, which is similar in character to something that has made an impression, either conscious or subconscious, on the person who sees the picture. This stimulating of an emotion is effected by means of the choice of subject, the arrangement

THE MONK G. W. HARTING.

of masses or lines, the selection of key, and the arrangement of values, and, to a certain extent, by means of the superficial texture of the print or painting. It is not to be supposed that the texture is as important as the other factors named, but it is a help in gaining the desired result, and is by no means to be ignored, since it operates by stimulating the esthetic sense, or, in other words, appealing to the imagination.

In considering the means whereby this effect of texture is to be obtained, we notice first that there are two forms of texture, which we may conveniently designate as inherent and adventitious, the first indicating that texture which is apparent at all times, the second that which is seen only in portions of the picture, or which depends for its visibility on the lighting of the print. The two are not always distinct, for it will often be found that a texture which does not depend on lighting may be concealed in portions of the picture. For instance, if a platinum print be made in a high key on a Shidzuoka vellum, the texture will be visible throughout, but if the same paper be used for a full-scale carbon, the texture will be hidden in the shadows. However, the classification is sufficiently precise for the present discussion, and we will therefore adhere to it.

It will be apparent that the texture chosen must depend not only on the character of the picture, but also on the size. For instance, if we were printing a portrait of a young girl in a high key, it would be absurd to use a rough Whatman paper if the print were 5x7, though it might be well adapted to the purpose if the print were from a 14x17 negative, and, similarly, it would be ridiculous to use a hand-made Barcelona paper for 18x22 prints, the effect of this paper depending on close inspection. So we must take into account the key of the print, the medium which is employed, the size, and the effect which it is desired to produce.

Of course, I cannot give definite instructions for the various papers which must be used for different results, and all that I can do is to make a few suggestions and to state what papers I use most. For small prints the texture should be inconspicuous, and should, generally speaking, be of the adventitious sort, thus adding an element of surprise when seen unexpectedly, such prints being more often examined in the

THE TWO MARYS.

hand than framed. For large prints it may be either inherent or adventitious, and may be much stronger than is the case with small pictures. I personally use the following papers more than any others. For small, high-keyed platinums, either Strathmore charcoal or hand-made Barcelona paper. For small, full scale platinums or gum-platinums, Shidzuoka vellum or the Ivory Blackpaper of Willis and Clements. For small carbons—my carbons are practically all full scale, the medium being rarely used for either high or low key—the "Linen Lawn" card—three ply—of Eaton, Crane and Pike, and for large carbons either this or one of the Whatman papers.

The best advice that I can give to anyone who is desirous of making the most of his pictures is to procure a number of sheets of these papers, as well as any others that may seem to him desirable, and to experiment with them, making small and large prints, in both high and low keys as well as full scale prints, studying the results. Of course, this implies that he either sensitizes his own platinum paper or prepares his own carbon transfer paper—if he prints in gum he necessarily makes his own paper—but one who is really interested in pictorial work will not be likely to use the commercial papers, and even if such should be the case the knowledge gained from this series of experiments would, I believe, be sufficient to cause any really enthusiastic worker to adopt the slower but more advantageous method of working.

REAL MOONLIGHT PHOTOGRAPHY

By WILLIAM S. DAVIS

IN selecting a subject for this issue of THE ANNUAL I have chosen moonlight work because it is a branch we hear little about, although offering many opportunities for unique and beautiful pictorial compositions at all seasons of the year.

As readers undoubtedly know, the so-called moonlight photographs frequently seen are simply under-exposed snapshots made against the sun, and then printed deep; so in consequence many think real night photography without the aid of artificial light is out of the question, but such is not the case.

No special equipment is needed, but I would suggest a focusing camera simple enough in mechanism to allow of easy handling, mainly by sense of feeling, as most desirable.

Regarding the lens: a good Rapid Rectilinear working at F/8 is excellent, and preferably of long focus in proportion to the size of plate in use, because when the moon is included the image made by a short focus lens looks smaller than the visual impression of its relative size. Lenses of larger aperture are, of course, desirable because of permitting one to cut down the exposure, but a cemented type of anastigmat is better when a strong point of light (such as the moon or an electric) is included than those made with air spaces between the components.

Exposures vary from a few minutes in the early evening, when a little of the daylight afterglow is still present, up to half an hour or so for full night effects, working with a lens at F/8, and using fast plates. After night has fully set in a good deal of latitude is allowable in exposing, providing it is upon the full side.

Figure 1.

SHADOWS DARK AND MOONLIGHT SHEEN.

Illustrating article "Real Moonlight Photography," by William S. Davis.

In selecting suitable material one should aim to secure a pleasing silhouette composition of objects against the sky, for the masses which always show a variety of tone gradation by day blend at night into broad flat dark areas of nearly uniform strength, consequently the average scene consists mainly of a few well defined tonal divisions. Thoughtful observation and analysis of moonlight effects will make this point clear.

Bearing in mind the alteration in effect referred to, it is possible to locate many subjects by daylight, using a pocket compass to determine the approximate position of the moon in relation to the composition, thus saving considerable time later and allowing more work to be accomplished in an evening. By going out one or two nights before the moon fulls it is possible to start with early moonrise effects at twilight and continue working all the evening.

In focusing absolute sharpness is not desirable, as the softness and mystery of the night atmosphere are better expressed by allowing some diffusion of definition.

Owing to the length of exposure ordinarily required it is evident the moon cannot be included during the landscape exposure without showing motion, but when it is desired to have it in the picture all that is necessary is to make the exposure upon the landscape as usual, keeping the moon outside the angle of view, then withdraw the plate holder, move the camera until the image of the moon appears in the desired place, and expose again for from ten to twenty seconds. As the second exposure is so much shorter than the first, there is no danger of getting a double image of the foreground. To facilitate the correct location of the moon a bit of gummed paper with a hole in the center may be attached to the focusing-screen at the spot desired before altering the position of the camera.

Reference has already been made to the small sized image of the moon produced by the average lens, but if a longer focus one is not available the image can be made considerably larger by racking the lens out well beyond the point of normal focus before making the second exposure, the resulting diffusion being rather beneficial than otherwise.

Figure 2.

Illustrating article "Real Moonlight Photography" by William S. Davis.

In developing by the tray method it is best to begin with a rather weak developer, say one-half to one-third normal strength, and after allowing plenty of time for this to act, finish in a full strength solution if it seems necessary. As the greater portion of night compositions naturally consists of dark masses one must expect the resulting negatives to appear thin, so this fact should be thought of when examining the plates during development.

In the selection of surface, color, etc., much can be done in printing to increase the pictorial quality and strengthen the night effect; rough papers, especially some of the pigment processes, being particularly suitable, but this phase of the work must be left to the taste of the reader.

In selecting illustrations I have tried to choose those which would bring out the more important points referred to, and in conclusion append herewith the technical details concerning their production.

SHADOWS DARK AND MOONLIGHT SHEEN. (Figure 1.) June evening. Exposure 20 minutes, commencing at 8.15 P. M. Stop F/8, R.R. lens. Cramer Inst. Iso. plate.

THE WHITE MOON CLIMBS THE SKY. (Figure 2.) August. Exposure 20 minutes for tree branches, starting at 7.45 P. M. Stop F/8, R.R. lens. Inst. Iso. plate. Separate exposure of 20 seconds for moon alone.

THE MOONLIT ROAD. (Figure 3.) February evening, with some light from the afterglow. 5.30 P. M. Exposure 20 seconds. Stop F/8, R.R. lens. Inst. Iso. plate. Separate exposure of 5 seconds for moon.

Figure 3.

THE MOONLIT ROAD.

Illustrating article "Real Moonlight Photography," by William S. Davis.

Figure 1.

SOFT FOCUS ENLARGEMENTS

By T. W. KILMER

THERE is no doubt in my mind but that the soft-focus picture is here to stay. The public is gradually being schooled into realizing that the sharp, steel-plate-appearing print of a landscape or portrait is just about the most unnatural thing in this wide world. Nature realized this when human beings were first created; therefore, we were supplied with soft-focus organs of sight.

We may think that we see things in nature sharply defined, but we do not. If we are called upon to center our gaze upon a diamond, coin, or any small object, then the sharp, anastigmatic effect is produced by muscular contraction, and as our gaze is relaxed the soft-focus effect is again present.

The photographic public, therefore, must necessarily produce soft-focus photographs in order to please or be pleased. There are many ways of producing diffusion in direct photography, and also in enlarging. The out-of-focus anastigmat, the intervention of chiffon, and the soft-focus lens are three

Figure 2.

Figure 3.

Illustrating article "Soft Focus Enlargements," by T. W. Kilmer.

common ways of producing so-called diffused pictures. In making "soft" enlargements we may employ any of the three above named methods, but in my experience there is only one right way to make a soft focus enlargement and that is:

First: Enlarging direct from a negative made with a soft-focus lens, or

Second: Making a soft-focus negative from a negative made with an anastigmatic lens, and then using the newly made soft-focus negative for enlarging.

I have tried for many years to enlarge *direct* from an anastigmatic negative by the use of a soft-focus lens in my enlarging camera, and I have failed every time in producing an enlargement which would meet my expectations. I make my soft-focus enlargements as follows:

Let us look at Figure 1 which is a contact print from an ordinary small kodak film negative made through a Dagor lens. Now regard for a moment Figure 2, which is a direct enlargement of the film using a 9 in. Verito soft-focus lens. We get here a passable pale, weak enlargement. If we try to increase our exposure to bring out the "meat" of the film, behold our result in Figure 3. Herein lies the great trouble in using a soft-focus lens for direct enlarging from the anastigmatic negative. The shadow, or flare, or whatever you care to call it, is plainly visible destroying the whole thing.

Remedy: Note the good values of Figure 4 which is an enlargement direct from a soft-focus negative made with a 9 in. Verito lens from a positive, which positive was made from the original film negative.

The Method: Take any negative made with an anastigmat or "sharp" lens. By contact printing in a printing-frame, or by reduction in a lantern or camera, make a positive on a slow plate (I use Seed 23). Place this positive in the window, or in front of any other form of illumination and photograph it through a soft-focus lens (Verito) on a slow plate (Seed 23). You now have a soft-focus negative of your scene which is exactly as good as though you had used a soft-focus lens in taking the original scene.

Enlarge this soft-focus negative in any style of enlarger and you will have something which is worth the little extra time spent in its production.

Figure 4.

Illustrating article "Soft Focus Enlargements," by T. W. Kilmer.

PLATINUM—WATER DEVELOPED

By GUY SPENCER

PLATINUM is conceded by the cultivated to be the paper par excellence for pictorial effects. The beauty and richness obtainable, their absolute permanency, the ease of manipulation, the variety of modifications possible in development make it the paper best adapted for use by those desiring prints of a distinguished character.

An impression prevails that platinum requires special kinds of negatives to secure the best results. One authority writes that any good negative giving a desirable print by other methods will afford a still better one on platinum, but he qualifies this statement, however, by saying, "platinum printing is not favorable to poor and indifferent negatives." If by poor and indifferent is meant thin and flat, platinum may produce prints anaemic and weak, but by a little "humoring" which takes the form of clear water for the developer these same negatives will give place to prints of soft tones and pleasing gradations.

Water-development has possibilities which every worker in platinum who has not tried it will find absorbingly interesting, and highly satisfactory in results. The process is suited to very thin, flat negatives, that with the regular oxalate of potash yield prints of undesirable flatness, dull and tame.

Through the "Imp of Mischance," it often happens a particularly clever pose, a portrait impossible to duplicate or something specially desired of the best comes out deficient in printing quality. When this happens try water for the developing agent, then make another print using oxalate and note the difference. Place the two together for comparison; that developed with oxalate is heavy with a leaden sameness; the one developed with water gratifies by reason of soft gradations. And, too, the operation is decidedly simpler than

Figure 1.

Illustrating article "Platinum—Water Developed," by Guy Spencer.

the various modifications recommended for negatives not up to the standard.

The only requisites are a thin, flat, portrait negative, some platinum paper of the so-called black variety—(the sepias proving less satisfactory)—clear water, room-warm, and the bath of hydrochloric acid. It is always difficult to give any very definite instructions regarding the depth of printing. Each worker has his own particular mode of judging when the action of light has gone far enough. Speaking generally, print deep. When the image fades out and then returns is about the time to remove it from the frame. However, a few experiments will determine. A slightly reddish hue visible through the clearer portions of the negative seems to indicate over-printing.

When ready for the developer, the paper is immersed in the clear water after your own pet fashion and allowed to remain until your individual taste is suited. Development is somewhat slow, and up to a point the print will continue to darken. It is then cleared in the acid bath, washed and dried as usual.

The prints submitted for illustrations (Figures 1 and 2) were treated in this way. The gradations are soft, and the general effect satisfactory. When developed in oxalate they proved hopelessly dull, tame and disappointing.

The picture entitled "A Study" (Figure 1) was subjected to rather prolonged printing. It has very much the look of a gum-platinum, and was so regarded by several persons who know a gum-platinum when they see one.

These remarks by no means cover the subject. They merely invite you to make a try-out of a process potentially interesting.

The most satisfactory feature of following out the suggestions of others lies in the possibility of further investigation and the likelihood of adding to the sum-total of photographic knowledge.

Figure 2.

FEAR.

Illustrating article "Platinum—Water Developed," by Guy Spencer.

THE ANASTIGMAT LENS AND THE AVERAGE AMATEUR

By A. H. BEARDSLEY

WHY should anyone who is getting satisfactory results with a moderate priced camera desire an anastigmat lens? As a rule there are two reasons: one is that it seems to be the thing to own an anastigmat lens; the other is that you really have grown to need it. These two reasons are by no means exhaustive and, to some, they may appear irrelevant; yet, let us have a look at them before expressing a definite opinion. This article claims to be neither scientific nor a literary masterpiece. It does, however, hope to make all those interested in the anastigmat lens get down to business and realize that the successful use of any high grade lens depends to a great extent upon the man behind it.

Let us assume that you have passed the Brownie stage of photography successfully and that you are now the proud owner of a good 3A folding camera. Your results with it are *to you* satisfactory in every way. You are no expert, neither are you sufficiently interested to pursue the subject of photography any further. All you require is a passable record of your outings and some recognizable likenesses of the people you meet. You press the button and your dealer or corner drug store does the rest. Suddenly into this contented photographic haven bursts a storm in the shape of a friend with an anastigmat lens. From this moment your photographic peace of mind vanishes. Without recording the hours spent with catalogues and your friend in the will-o'-the-wisp search for a suitable lens, let us assume again that you have finally purchased a true anastigmat. Then your troubles begin with a vengeance. Your pictures are over or under-exposed, out of focus, lacking in depth, muddy looking and otherwise inferior to those you have been getting with the old rapid rectilinear lens. You are still as anxious as ever to get good pictures, but you do not care to go into photographic optics enough to find

BREAD AND MILK. S. P. EMERICK.

out why your pictures are a mess. Come what may, *all* that you are going to do is press the button. That is the way you got results before.

At length, after a few more heavy hearted trips to the dealer or corner drug store you settle back with the conviction that you have been quietly and systematically buncoed. To you, all anastigmat lenses of high and low degree are a snare and a delusion. Here you have spent a goodly sum for an article which you were led to believe would produce snappy-brilliant pictures and, as a matter of fact, you could do better work with a cheap little Brownie and its meniscus lens. Ten to one you become both discouraged and disgusted. Unless the unforeseen happens your photographic days are numbered.

When you have reached this point in your photographic career take comfort,—you are one of many. The fact is you had no business to buy an anastigmat lens. Why? Because you had no intention of doing your share toward getting your money's worth out of it. A motto handsomely framed and illuminated by electric lights should be hung in every store to read, "Never buy an anastigmat lens without solemnly taking the oath to master its proper use." Just because you paid fifty dollars for a lens in no way guarantees you better pictures. Note this and give it thought. The more you pay for your lens and the greater its reputation the more time and attention you *must* devote to it in order to obtain results. This statement is born of actual fact.

If you belong to the press-the-button-let-the-other-fellow-do-the-rest class of amateurs, stick to your rapid rectilinear. You will be happier, and so will the dealer and the manufacturer of the lens.

We all agree that the modern anastigmat lens is the best and ultimate equipment which the amateur should make every effort to obtain. However, let us be frank and admit that all amateurs are not ready or able to get results with the anastigmat. Manufacturers and dealers should bear in mind that it is the *successful* amateur that keeps things photographic on the jump. In short, if the man with the rapid rectilinear has reached the top of his photographic career and cares to let well enough alone, it is better to have it so.

A WET DAY ON FIFTH AVENUE. WILLIAM H. ZERBE.

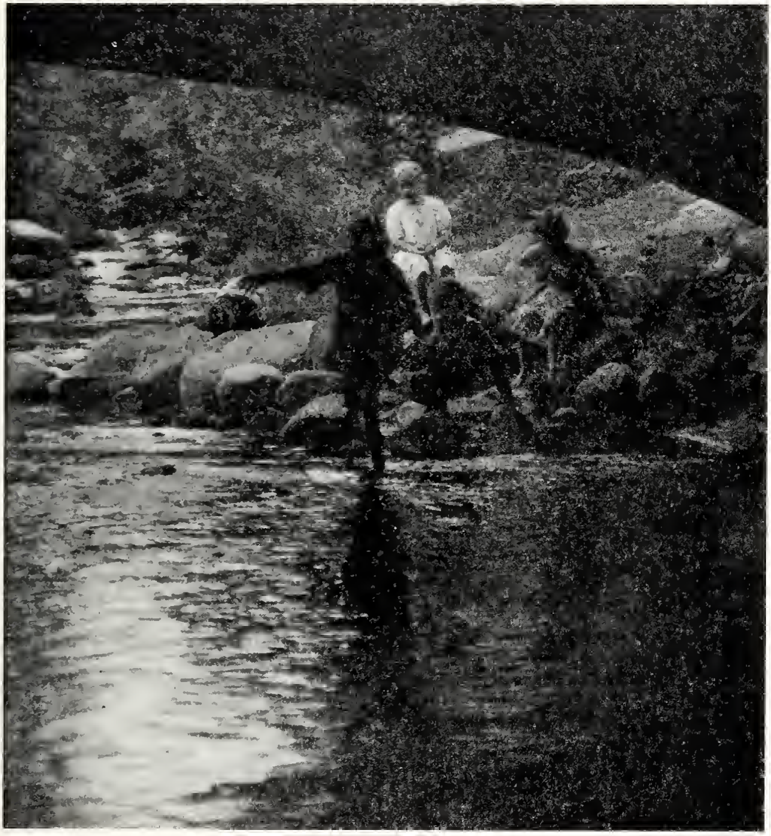
He will continue to buy films, plates and paper. This amateur if he bought an anastigmat lens and failed to get results equal if not superior to his old lens would soon consign everything photographic to the ash can.

Now, let us consider the amateur who has grown to need an anastigmat lens. We now have to deal with consistent progress and the real desire to improve photographic efficiency in equipment and in head work. This type of amateur began in exactly the same manner as the first one with the important difference that the first man gave his picture taking as little thought as possible, while the second man believed in asking himself and others why. In short, up to the point he had now reached our second man knew very nearly all there was to know and for this reason he knew just why he could use an anastigmat lens in his work. He understood the limitations as well as the great advantages of the anastigmat. He realized that he must do his share.

In the modern anastigmat lens he recognized a wonderful tool which he must handle with thought and care. He knew that a high grade lens did not necessarily require an expert to handle it, yet he did know that practical common sense had a great deal to do with getting successful results. This amateur's photographic experience grew broader and more interesting with every picture he took. The anastigmat lens in his hands did exactly the work he planned for it and, most important of all, he *knew* what to do and what to expect year after year.

In amateur photography real interest and consistent growth win results as surely as in other forms of human activity. The preceding paragraphs were not written to discourage the purchase of the best lens and camera to be had. They were written rather to discourage the making of such a purchase without being prepared to get the maximum return on the investment. Examine your own fitness. If you decide to buy a good lens make up your mind that you are going into the game for all there is in it. Even if your photographic work is a hobby, ride it to the limit.

We all admire enthusiasm in anything that is worth while. Get a few good books which avoid the too technical and read them slowly and thoroughly. Get into photographic optics



AT PLAY. G. W. Harting.

deep enough to know how to make your lens earn its salt. It pays. In buying an anastigmat lens remember to base your selection upon the *actual results* obtained by trial and not solely upon someone's opinion. The name and reputation of the maker naturally merit consideration, yet *you* are buying the lens for *your* work and *you* should make your decision based absolutely upon what the lens has done for *you.* This is your right. If you prefer a lens that no one ever heard of, that is your business. If the lens does the work you like, stick to your choice; you will do good work with it because you have confidence in it and in yourself. Be sure to get all kinds of advice regarding the lens for you, but make the decision yourself and see to it that your own good common sense is the deciding factor.

In conclusion let me urge every amateur to think more, and in so doing get more out of photography. There is no cleaner, finer hobby in the world. We should all be proud of it and make it more worth our while with each succeeding year. The anastigmat lens has now come to help us reach an even higher standard of amateur work. There are unlimited possibilities ahead. However, let us make sure of every step we take. Remember, a camera is only as good as its lens and a lens is only as good as the *man behind it.*

WATER WEEDS. MAURICE THOMPSON.

FOCUSING SCALES—USEFUL AND OTHERWISE

By A. LOCKETT

COMMON-SENSE would certainly suggest that so important an adjunct to good definition as the focusing scale should be reasonably accurate, yet it is by no means unusual to come across hand cameras replete with every modern luxury in the way of mechanical fittings and adjustments, but in which the scale of distances is notable for shameless unveracity. To avoid misunderstanding, it may be stated that these remarks are made in an international sense, and do not refer exclusively to the apparatus of any one country. Were it not for the short-focus lenses generally fitted, which allow a good deal of latitude owing to their depth of definition, the defect would receive more attention. As it is, it often escapes notice, though the worker may have an uneasy consciousness that his negatives are not always as sharp as might be expected, especially when the full aperture of the lens has had to be used.

There is no denying that in many of the cheaper hand cameras, and a few even of the more expensive ones, the arrangement of the focusing scale and pointer is far too haphazard and inexact, compared with the care taken over parts that in reality are less important. It is not uncommon to find the pointer raised quite 3/16 in. or ¼ in. over the scale, thus making it difficult to judge when it corresponds with the graduations, as viewed from above. In addition, the pointer is often so stumpy and blunt that exact registration with any given line on the scale is a sheer impossibility.

In some of the lighter and more fragile folding cameras the fronts cannot by any stretch of imagination be called rigid, but have a slight amount of lateral play or swing. It is clear, in such circumstances, that uneven pull on the front when drawing it out may move it a little more to one side than the other, and thereby cause a decided error in the

THE DECISION. MARY CARNELL.

reading of the focusing scale. Now and then one meets with a badly-designed camera in which even the tightening of the clamping screw that secures the front at the desired distance on the base-board makes an instant alteration in the position of the pointer.

So much for the possibility of erroneous indications by an accurate scale. Yet another source of error arises when the scale itself is wrongly graduated, or, it may be, correctly graduated but not fixed in the proper place on the base-board. The first fault may happen from a lens of different focus to that for which the scale was intended having unwittingly been fitted, while the second may readily occur through the unnoticed shifting of the scale on the polished wood while being fixed, and the omission to test it afterwards. Although scarce in good quality apparatus, such deviations are occasionally met with, and it is always sound policy to verify the scale by focusing on carefully measured distances at full aperture, before treating it with too implicit faith.

A few hints on checking the accuracy of the focusing scale may be useful, for there are several wrong ways of going to work. The "infinity" mark presents no difficulty. The camera is set on a stand, or any convenient support, and is focused as sharply as possible, with the full aperture of the lens, on some really far-off object, such as a distant factory chimney or church spire. The scale is then consulted, and if the pointer is exactly over the infinity graduation well and good. If not, all the other marks are probably wrong as well.

Supposing, however, the infinity mark is correct, the shortest distance on the scale may next be tested. The pointer is set to it and, having levelled the camera, a cord to one end of which a small weight is tied, is fastened around the lens at the position of the diaphragm (assuming the lens is a rectilinear or anastigmat), so that the weight just misses the ground, as shown at A in Figure 1. When it has ceased swinging, the point directly under the weight is marked on the ground by a chalk line, or by driving in a peg. There is next required a white card about 1 ft. square, having a black cross painted on it, as at B, also a stick or cane C about 5 ft. long, pointed at one end and with the other end split to hold the card. Say the shortest distance on the scale is 5 ft. From the mark or peg below the lens diaphragm a distance of 5 ft. is carefully measured, in line with the lens axis, and at the end the pointed stick is driven in, making certain it is truly upright by trial with a plumb-line. The card is then inserted facing the camera and its height adjusted till the cross is seen approximately in the centre of the ground glass. If the scale is correct, the cross should now be in perfectly sharp focus at full aperture. For further corroboration, the front of the camera may next be pushed or racked right in, without disturbing the other adjustments, and the cross focused sharply on the ground glass without consulting the

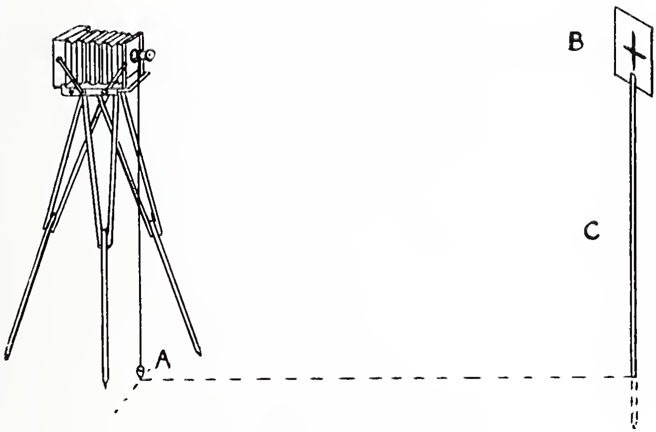


Figure 1.

scale. When this has been done the scale may be referred to, and if the pointer again stands at the 5 ft. mark all is well. Should both infinity and the nearest distance prove to be accurate on the scale, the presumption is in favor of the other distances also being correct, though it might, perhaps, be wiser to test these too. Some scales do not have any infinity mark, in which event the longest distance, usually 100 ft., must be tested instead.

If, however, the scale is found to be wrong, the best thing to do is to remove it and make a new one. There are various ways of doing this, the most obvious being to glue or otherwise attach a strip of white paper, thin card, celluloid or ivory to the camera base-board, and to focus at full aperture on a series of carefully measured distances, marking the exact position of the pointer on the white surface for each distance and inserting the necessary figures. This may be done in pencil first and afterwards neatly inked in. Properly carried out, this method is a sure one, though rather troublesome.

Another method, often exceedingly useful, arrives at the results by calculation. It is necessary, however, to know the focal length of the lens, and the infinity position for the pointer must be ascertained by focusing at full aperture on a remote object, and marked on the base-board. Then the positions to be marked for any desired distances may be found as follows: Square the focal length of the lens and divide the product by the distance in inches *minus* the focal length. The quotient gives the distance of the required mark from infinity on the scale. For example, suppose the 5 ft. mark is wanted, the lens being of 6 in. focus. The calculation is then: $\frac{6 \times 6}{60 - 6} = 2/3$ in., that is to say, the 5 ft. mark must be measured off 2/3 in. from the infinity mark. Likewise, the mark for 25 ft., with the same lens, would be $\frac{6 \times 6}{300 - 6} = 6/49$ in., or practically 1/8 in.

Not only for the hand camera, but even in many cases with a stand, on occasions when it is inconvenient or impracticable to examine the image on the ground glass, a focusing scale is invaluable. The simple formula given in the preceding paragraph is often of great service for architectural and similar work, when photographing in confined situations. If the camera is not furnished with a pointer, a mark may be made at any appropriate part of the moving lens front, and the position of this mark when the lens is focused for infinity should be indicated by a notch or line on the base-board. Then, when any awkward subject has to be dealt with, it is only necessary to ascertain or estimate its distance from the lens, and to calculate how far from infinity the mark on the front must be advanced. This distance is then measured off on the base-board and the front racked out to correspond, when accurate focus will be obtained.

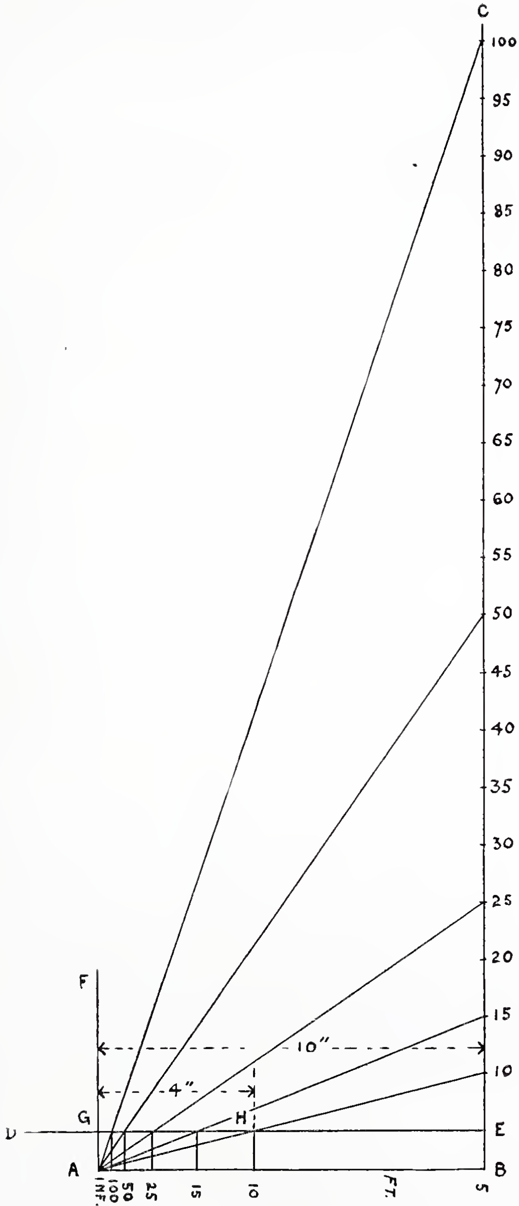


Figure 2.

Illustrating article "Focusing Scales—Useful and Otherwise," by A. Lockett.

If the focal length of the lens is not known, it may readily be found as follows. Focus sharply at full aperture on an object of convenient size at a measured distance, and measure accurately the length of the image on the screen. Then multiply the distance in inches by the length of the image, and divide the product by the length of the object *plus* the length of the image. The quotient gives the focal length. Thus, suppose the object is a 6-in. rule, the distance being 5 ft. and the length of the image 1½ ins. Then, $\frac{60 \times 1\frac{1}{2}}{6 + 1\frac{1}{2}} = 12$ ins. focus. Provided the camera extension will permit, there is less likely to be an error in measurement if the object is focused full size, or as near full size as possible. Obviously, if desired, the cross on the card B (Figure 1) may be drawn with arms of a definite length, and used instead of a rule.

There are various geometrical methods of making a focusing scale, but, owing to the small spaces involved, the average individual is liable to obtain inexact results unless great care is taken. The following way, however, partly arithmetical and partly geometrical, reduces the risk of mistakes and is accurate enough for all practical purposes. Draw a line A B (Figure 2) equal to the distance between infinity and 5 ft., as found by calculation. In order to make the diagram more easily understood this has been taken as 10 ins., which would be the correct distance with a 20-in. focus lens. From B erect a perpendicular B C of indefinite length. Draw D E parallel to A B at any convenient distance, say 1 in., and at A erect a perpendicular A F cutting D E in G. Now, calculate the distance from infinity to 10 ft., which with a 20-in. focus lens will be 4 ins. From G mark off G H, 4 ins. long, and from A through H draw a line cutting B C in 10. With the dividers, take the distance between E and 10, and mark off from 10 on the line B C eighteen similar distances, numbering them as indicated. Lastly, from A draw lines to the 100, 50, 25 and 15 marks on the line B C, and where these lines cut G E, and also from H, let fall perpendiculars, completing the scale A B G E, which may be numbered as shown. In the same manner, any other desired distance may be inserted on the scale by drawing a line from A to the mark representing it on B C, and noting where the line cuts G E.

John M. Whitehead.

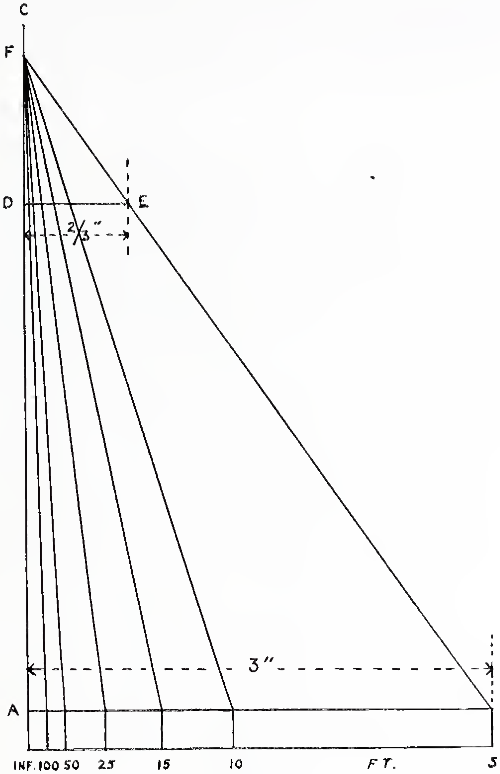


Figure 3.

Many people have an idea that all focusing scales have proportional graduations, so that, for instance, if the total length of one scale from 5 ft. to infinity is double that of another, each of the graduations on the first scale will also be exactly twice as far apart as the corresponding graduations on the second scale. This is not strictly true, as the curious can soon prove for themselves by calculation; but in the case of lenses of not too long focus, where the whole scale is short, the error is small and the results secured by proportional methods are near enough for ordinary work.

Figure 3 shows a simple way of obtaining a new focusing scale by geometrical means from an existing one, in which the distance from infinity to 5 ft. is, say, 3 ins. Make a copy of the existing scale A B, and from A erect a perpendicular A C of indefinite length. Suppose the new scale is required for a 6-in. focus lens. By calculation the distance from infinity to 5 ft. should, in that case, be 2/3 in. At any point D on the line B C draw D E parallel with, but not too near, A B, and make it 2/3 in. long. From B, through E, draw a line cutting A C in F. Lastly, from F draw lines to all the graduations on the scale A B. Where these cut D E will be the required graduations for the new scale.

There is an interesting photographic method by which a new scale can be made from an existing one. The rule is:

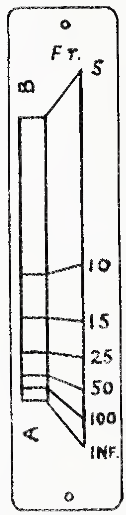


Figure 4.

Divide the length of the existing scale by the length of the desired scale, multiply the quotient by the focal length of the lens for which the new scale is intended, and add the focal length. The result gives the distance from which to photograph the scale for the necessary reduction. For example, the existing scale is 2 ins. long, and it is desired to make a new scale for a lens of 5 ins. focus, which, according to calculation, will need to be 5/11 in. long. Then $2 \div 5/11 = 4\ 2/5$; $4\ 2/5 \times 5 = 22$; and $22 + 5 = 27$. If, therefore, the 2-in. scale is focused sharply with the largest stop of the 5-in. lens

WHISPERING REEDS. E. I. MCPHAIL.

at 27 ins. distance, it will be reduced to suit that lens. The graduations may then either be traced on to a card from the screen, or an exposure may be made and a print obtained from the negative, from which the slip containing the scale may be cut and stuck on the base-board, making infinity coincide with an infinity mark previously found by focusing on a distant object. Care must, of course, be taken that the print does not expand or contract as compared with the negative.

When the lens is of short focus the graduations for the longer distances will be so close together that there is no room to insert the numbers. Figure 4 illustrates how to overcome this difficulty. From each of the graduations on the scale A B diverging lines are drawn, and against the outer ends of these lines the numbers are written.

It will be noted that, with a very short scale, the distances exceeding 25 ft. may be obtained with quite sufficient accuracy by merely bisecting other distances. Thus, 50 ft. is half the distance between infinity and 25 ft.; while 100 ft. is midway between 50 ft. and infinity. Likewise, if 30 ft. should be marked on the scale, 60 ft. will be half the distance between 30 ft. and infinity; or 80 ft. would be midway between infinity and 40 ft. This fact affords a ready means of inserting the infinity mark on short scales which do not contain it, for infinity will obviously be as far from 100 ft. as 100 ft. is from 50 ft.

In conclusion, it may be remarked that some workers are apt unjustly to blame the focusing scale for unsharp negatives, when the fault is really due to their own erroneous estimate of distances. The correct mental appreciation of distance only comes from practice, and some photographers never really attain to it, just as certain individuals have no musical ear, or are color-blind. For such, and indeed for all who desire greater accuracy, and therefore enhanced success, the use of a telemeter is strongly advised, whenever practicable.

THIS LITTLE PIG WENT TO MARKET.

GOODLANDER SISTERS.

THE FARM HOUSE.

Figure 2.

PERSPECTIVE AND THE LENS

By J. A. ANDERSON

PERSPECTIVE effect in photography, as in nature, is due to the well known fact that as the distance of objects from the observer increases there is a gradual diminution in their apparent color intensity and distinctness of detail and an apparent reduction in size. It is the latter which is to be here discussed.

From the fact stated it is evident that the appearance of the extent of distance in a picture must depend upon the greater or less distance of the lens from the objects represented. For a simple illustration of this, place, on a level plain, two poles of equal height, say fifty feet apart, and in line with the camera. With the latter twenty-five feet from the nearest pole the second will appear on the ground glass one-third the

Figure 1.
GATEWAY OF THE GARDEN OF THE GODS.

height of the other; at fifty feet the proportion will be one-half; and at one hundred feet, two-thirds.

From this we see that the nearest position of the lens gives the greatest contrast in the sizes of two objects and, hence, their greatest apparent distance apart, while with the lens more distant the opposite is true. Thus, the perspective effect, as to the distance represented in the picture, is controlled by the relative position of the lens.

In this example the proportions are comparative, with nothing by which to judge of the actual height of the poles and their distance from each other. For this, and in any picture where size is to be indicated, there must be some figure of recognized dimensions for comparison.

Bearing these points in mind we proceed to some practical illustrations of them.

The "Gateway of the Garden of the Gods," a few miles from Colorado Springs, is an opening some two hundred feet wide between rocky masses three hundred and thirty feet high. One purpose of the accompanying picture (Figure 1) was to express the massiveness of these rocks as it impresses

Figure 3.

CROSSING THE PLAINS.

the observer. The purpose partly failed because of the absence of any object with which comparison might be made. A near-by carriage or person would have served the purpose.

Through the "Gateway" is seen a mountain range, several miles away, which includes "Pike's Peak," the summit of which is fourteen thousand feet above sea level and probably half that above the level of the "Garden." The distance is interrupted by some comparatively low hills and the extent of the intervening space is but imperfectly shown. Hence,

Figure 4.

THE WHITE OAK.

Illustrating article "Perspective and the Lens," by J. A. Anderson.

the range, but for its caps of snow, might be mistaken for one of quite moderate height.

A view from a more elevated position would have given the "Peak" greater prominence and, perhaps, might have revealed some better indications of its distance away.

In the picture of "The Farm House" (Figure 2), with cattle grazing in the meadow, no incongruity is felt from the fact that the height of the cow in the foreground is equal to that of the distant house. The apparently small size of the latter is accounted for and the perspective effect is completed, by the diminishing sizes of the other animals and of the road and fence, marking the distance.

In the view "Crossing the Plains" (Figure 3), taken from the rear of the train, the distance is sufficiently shown by the recognized width between the rails and their gradual convergence toward the vanishing point. The introduction of additional, unnecessary objects would have marred the unity of the view.

As a rule the contrast in size and its effect upon the perspective will be too marked with the lens very close to the subject. The reverse is the case with the picture of "The White Oak" (Figure 4), where the camera was placed as close as possible, in order to get as large a picture as the plate would admit. The character of the subject was such that the fine proportions of the tree could be preserved without evidence of undue contrast in the sizes of the parts. The magnitude was emphasized by the proximity of familiar objects and by the indication of extreme distance in the diminutive size of the distant dwelling.

In the representation of buildings by the lens, the horizontal lines not square with the line of sight converge toward the vanishing point. The nearer the lens the greater is the degree of convergence. Good judgment will so place the camera as to get the most pleasing effect in this respect. Vertical lines must be vertical in the picture. If they appear otherwise, from tipping the camera without placing the plate vertical by the swing back, the defect may be corrected by copying the negative or print in a position correspondingly tipped.

Figure 5.

INDIAN PIPES.

Illustrating article "Perspective and the Lens," by J. A. Anderson.

With small objects having depth, especially when photographed of natural size, care is needed to avoid too great contrast in size of the near parts with those of the more distant. In the "Indian Pipes" (Figure 5), taken at somewhat less than natural size, there is a slight contrast in dimensions between the lower forward group and that above. Putting the lens nearer would have increased the contrast and perhaps tended to subordinate the upper, principal group.

Perspective has an intimate relation to the accepted rules of composition, but this is aside from the present discussion. The few hints here given are far from exhausting the subject, but they are presented with the hope that they may lead some to further study of the application of perspective principles to picture making with the lens.

TOWARD EVENING. ERNEST CLAYPOLE.

COLORED REPRODUCTIONS

By JOHN LEWISOHN

SINCE my article in the *American Annual of* 1915, I have invented and patented another method referring to colored photographic reproductions. This may be considered a sequel to the former described process or rather another and to a certain extent a more mechanical method, and, while both methods are in the same field, yet each one of them is distinct in character and either one of them can be employed according to the desire of the operator and the result be obtained. However, let the description taken from the patent specifications, which will hereafter follow, speak for itself:

In this new and patented method the blue color of a blue-print is made use of to superpose a series of different colors to produce a print in substantially natural colors. While this method varies from the one as described in last year's Annual fundamentally the same means are utilized.

The method consists in obtaining three negatives of an object to be reproduced on suitable orthochromatic silver emulsion photographic plates with the aid of three respective color screens by the well known three-color photographic process, so that one of the three negatives will produce a positive print with the yellow color value; another, with the red color value; and the third, with a blue color value. The blue print is made first from the yellow color value negative. The entire blue part of this blue print is washed with a yellow wash, such as aurantia, which is then dried and afterward immersed in a weak solution of silver nitrate sufficiently strong to dissolve the blue and leave the yellow image of the yellow color value negative. The so formed print is then washed, to eliminate the silver nitrate and dried. The side of the print bearing the image is then coated with a blue print sensitizing medium. The sensitizing of the print may be done to advantage before the print is quite dry, to get an even coating. The re-sensitized print is impressed with an image through the red color value negative, which negative is adjusted on the print so that the image formed by the red color value negative registers with the image under the coating formed by the yellow color value. The blue print so formed is washed with a red color wash, such as red eosin, and then dried and treated with a bath of silver nitrate, strong enough to dissolve the blue, leaving the red image on the yellow image previously formed.

After washing and drying the so-formed print, the side having the images is re-coated with a blue-print sensitizing medium, the same as previously stated, dried and exposed to produce an image through the negative having a blue color value, which image will properly register with the images formed by the previous negatives. The print so formed will have the blue color, the red color and the yellow color placed successively in the order described; and in combination will produce a picture of substantially natural color, i. e., the image on the print of the object will be substantially in its natural colors.

It is self-evident that the process can be used with only two, or with more than three colors if desired. The principle of the process consists in forming a series of superposing blue images, of which the preceding blue color of the image has been substituted by another color before the succeeding blue image has been formed.

MARIE AND ANTOINETTE. ALICE BOUGHTON.

SNOW PICTURES. AMERICA'S PRE-EMINENCE

By WILLIAM FINDLAY

FOR my annual contribution I have pleasure in submitting "The Path by the River" (Figure 1). I have to acknowledge American inspiration for this effort and any merit it may have.

In an honored place in my collection of prints I have two snow scenes—one by Phil M. Riley, to whom I am indebted for my introduction to American readers, and the other by J. B. Post. We perhaps appreciate most the unattainable. An inland dweller may sigh for the sea, and a resident by the seashore may long to portray lofty heights.

Living by the seashore snow pictures are only to be had on rare occasions; on others we are surfeited with them. Last Winter there was not one single opportunity, while on the previous one there was only one possible day, and this picture was secured on it.

Before I go further I may be permitted to say, however, that I have long been an admirer of American work in this direction. The skillful use made of the shadows in introducing artistic lines has been a revelation; and the texture of the snow and ice makes the picture quite realistic—especially on a warm day.

The technical skill displayed in securing this is appreciated by a novice in this branch of photography, for out of a series of six pictures taken on this excursion the one here reproduced, and the last developed, is the only one he considers of any value. Compared with much of the American work he has seen even it is much below the standard. It may serve, however, to illustrate the difficulties I overcame and portray an aspect of "Caledonia stern and wild."

In the course of my perigrination that day I came across vast expanses of untrodden snow. I endeavored to make pathways leading through gateways, etc., but the results looked too artificial. By the river's bank, however, there was a rough roadway. This under the snow looked charming, and the sun

Figure 1.
THE PATH BY THE RIVER.

being low in the heavens cast just the shadow that was wanted. Three exposures were made from different standpoints.

When it came to development (using pyro-soda) in the case of the first a weak developer was tried. The result was unsatisfactory—a lack of contrast. In the case of the second a normal developer was tried, and though much better than the first was still lacking in the contrast so necessary. In the case of the third pyro-ammonia, an old and well tried friend, was resorted to, and here success had to be chronicled—or at least comparative success. The resultant negative was crisp, full of detail, and inclined to be yellowish, but a print taken from it showed marked superiority over any of the others.

I do not pose as an authority in this branch, but from this experience I should be inclined to think that this old-fashioned developer might have first place. At any rate, should further opportunities for snow studies occur there will be no necessity of experimenting on my part.

THERMO PYRO IN THREE SOLUTIONS

By MALCOLM DEAN MILLER, M.D.

THE European War has had one very unpleasant effect on photographers in the form of increased prices for developing agents, potassium salts, and other imported chemicals. Solely as a matter of economy, many workers who, like myself, prefer other agents to pyro have been driven by circumstances to fall back on this old developer. Its disadvantages, as ordinarily used, are well known. Among them are the tendency to "plug" the highlights, the tendency to stain gelatine and skin, and the slow-printing properties of the negatives. These disadvantages, however, are not insuperable; by mixing the solutions properly, they may be overcome to any desired extent; by using the Thermo system, developing in a covered tray and not removing the plate until the time is up, the least trace of stain on nails and skin is prevented.

Years ago an English investigator, Chapman Jones, if memory serves, established the fact that to prevent pyro stain it was necessary to have the sodium sulphite proportionate to the bulk of the developer and not less than 10 grains of the anhydrous salt to each fluid ounce of ready developer. In other words, if a pyro developer is diluted, it should have sufficient stock sulphite solution added to preserve this ratio. The most convenient solution for all-year use is one of 12½ percent strength, or 60 grains to the ounce. I have modified the standard Watkins Thermo Pyro-Soda developer by removing the sulphite from the pyro stock and putting it into a separate solution, as follows.

A.—Water to make..............	10 ounces
Potassium metabisulphite	80 grains
(Or Lumière's liquid bisulphite 2 drams)	
Pyro	160 grains

INTERESTED. JOHN GORDON, JR.

B.—Water to make .... 10 ounces
Sodium sulphite, anhydrous... 600 grains

C.—Water to make.............. 10 ounces
Sodium carbonate, dry granular 880 grains
Potassium bromide .... 40 grains

This formula should be called "Modified Thermo Pyro-Soda," to distinguish it from the Watkins formula in two solutions. The temperature-coefficient is 1.9, and the regular Thermo tables published by the American Photographic Publishing Company apply in all respects save the use of the B stock. For convenience of reference, I am appending the complete information.

INSTRUCTIONS.—Look up the development speed of the plate and mix the developer as under "Dilution of Developer." Give a normal exposure to a trial plate and develop for the time found opposite the actual temperature of the developer in the "Table of Temperatures." Use for dilution water from a large bottle or pitcher which has stood in the room long enough to attain the room temperature. If the trial plate is too contrasty, try another with the developer one class more dilute. It should be noted that the system, as planned by Mr. Watkins, gives a negative well-fitted for P. O. P. and the softest kinds of D. O. P. If ordinary gaslight papers are used, the developer should generally be used at least one class weaker than normal for the plate, to avoid "soot-and-white-wash" effects. The greatest beauty of the Thermo system is that one can determine exactly the degree of contrast required by altering the dilution of the developer and thereafter can secure absolutely uniform results at any temperature. Ruby light can be used, if desired, but I find the most convenient way is to handle the plate in total darkness, pour on the developer, start the Improved Interval Timer (set for the correct time), cover the tray, and turn on the white light. The two trays are rocked a few times during development to prevent mottling. When the Timer rings, the white light is extinguished, the plate taken out by means of a plate lifter, rinsed, and dropped into the hypo tank, which is kept covered with a spare tray. Alternation of white light and darkness is easier on the eyes than red or even green "safe" light. I

PORTRAIT. Baker Art Gallery.

have never fogged a plate, as I use deep composition trays. The proportion of sulphite is sufficient to prevent chemical fog.

DILUTION OF DEVELOPER.—The figures under the code letters are fluiddrams of stock solutions A and C.

VVQ	VQ	Q	MQ	M	MS	M S	VS
1	1 1/3	1¾	2¼	3	4	5	6¾

Example.—To develop one 4 x 5 Wellington Anti-Screen plate, using the M dilution, take 3 drams of A, add to it ½ oz. B (containing 30 grains of anhydrous sulphite), and 3 drams of C; then add water to make the total volume 3 fluid ounces. To develop a Central Special XX plate, listed as VS take 6¾ drams each of A and C, ½ ounce B, and water to make 3 ounces. The tank dilution is based on a 10-ounce standard. Thus, to develop a dozen Cramer Spectrum plates in a 30-ounce tank, MQ dilution, I take 6¾ drams each of A and C, 5 ounces of B (containing 300 grains, so as to make each ounce of the dilute tank solution contain 10 grains of sulphite), and water to make 30 ounces. Tank developer thus mixed can be used over 70° without yellow stain, veiling, or chemical fog.

DEVELOPMENT SPEEDS.—The following list is offered as a suggestion for first trial. Each user must decide for himself what classification gives him just the contrast he desires.

ANSCO

Regular Film & Pack.....S
Speedex, " " " ...VS

BARNET

Film ....S
Superspeed Ortho ....M
Ortho Extra Rapid.....MS
Red Seal ....M
Red Diamond ....MS
Self-Screen Ortho ......MS
550 ....S

BURKE & JAMES

Atlas Film ....S

CENTRAL

Special XX ....VS
Special Home Portrait....S
Special ....M
Special Non-halation ...MS
Comet ....M
Colornon ....MQ
Panortho, S. and D. C..MQ

CRAMER

Crown ....S
Anchor ....MQ
Banner X ....S
Inst. Iso ....MQ
Med. Iso ....MQ

Slow Iso ....MQ
Commercial Isonon ....MQ
Portrait Isonon ....M
Trichromatic ....MQ
Spectrum ....MQ
Contrast ....VVQ

DEFENDER

Vulcan Film ....S
Vulcan (plate) ....S
Ortho ....MQ
Non-halation Ortho ....MQ
Slow ....VVQ
Process ....Q

EASTMAN

Motion-picture Film ....MS
Portrait (flat) Film ....MS
Speed Film ....VS
Graflex Film ....VS
Hawk-Eye Film ....S
N. C. Film ....S

ENSIGN

Film ....MS

FORBES

Challenge ....VQ
Snap Shot ....Q

HAMMER

Special Extra Fast
(Red Label) ....MS
Extra Fast (Blue Label)...M
Aurora Extra Fast......MS
Ortho Extra Fast........M
Ortho Non-halation ......M
Fast ....MQ
Ortho Slow ....VQ
Slow ....VQ

ILFORD

Monarch ....VS
Zenith ....VS
Special Rapid ....VS
Chromatic ....Q
Rapid Chromatic ....M
Ordinary ....Q

IMPERIAL

Flashlight ....M
Special Sensitive ....MQ
Orthochrome S. S......MQ
Special Rapid 225 & 200..S
Duonon ....MQ
Non-Filter ....MQ

LUMIÈRE

Sigma ....S
Blue Label ....MQ
Film ....S
Ortho A ....M
Ortho B ....MQ
Panchro C ....MS
Slow ....MQ

MARION

Record ....S
Brilliant ....S
P. S...................MS

PAGET

XXX ....M
XXXXX ....MS
Swift ....S
Extra Special Rapid ......S
Ortho Extra Special
Rapid ....MQ
Panchro Ordinary ....Q
Panchro Color ....VQ
Special Rapid ....S
Hydra Panchro ....MQ
Hydra Rapid ....MQ

THE WOODLAND PATH. WM. ARMBRUSTER.

Premo

Filmpack ....S
Speed Pack ....VS

Roebuck

Blue Label ....S
Ortho D. C. & S. C.....MQ

Rogers

Regular ....S
Ortho D. C. & S. C.....MQ

Seed

Graflex ....S
Gilt Edge 30 ....MS
Gilt Edge 27 ....M
26X ....MS
23 ....MQ
Non-halation ....MQ
Tropical ....M
L Ortho S. C. & D. C..MQ
C Ortho ....VQ
Panchromatic ....VQ
Color Value ....M

Standard

Extra ....MQ
Imperial Portrait ......MQ
Orthonon ....MQ
Polychrome ....MQ
Thermic ....MQ

Stanley

50 ....M
Commercial ....MQ

Wellington

Extreme ....S
'Xtra Speedy ....MS
Film ....M
Iso Speedy ....M
Portrait Speedy ....M
Anti-Screen ....M
Speedy Special Rapid ...MS
Ortho Process ....M

Wratten

Panchromatic ....MQ
Process Panchromatic ....Q

TABLE OF TEMPERATURES.—The times suitable for this pyro developer, with its temperature coefficient of 1.9, are as follows.

Degrees Fahrt.	Minutes Tray	Minutes Tank
80	3¼	12
78	3½	13
76	3¾	14
74	4	15
72	4¼	16
70	4½	17
68	5	18¼
66	5¼	19½
64	5¾	21
62	6¼	22½
60	6½	24

AFTER RAIN. Harold Cazneaux.

Table of Temperatures—continued

58	7	26
56	7½	28
54	8	30
52	8½	32
50	9¼	34
48	10	37
46	10¾	40
44	11½	43
42	12¼	46
40	13¼	49

LADY CHAPEL, DURHAM CATHEDRAL. ROBERT C. DAVIES

PORTRAITS IN COLOR

By CHARLES DONALDSON

THE production of portraits in color must be of special interest to all photographers and more particularly so to those who practice the art for profit. Yet professionals as a class have not taken the matter up with, to say the least, any degree of enthusiasm. And the reason undoubtedly has been the lack of any pronounced demand by the general public. It may be that the public have never had the opportunity to judge on the merits of color as presented in any of the three-color processes.

The autochrome, for portraiture, has not caught on. In my own experience examples have been much admired, but very few orders have been received. This is much to be regretted as the ease and certainty of the results with this plate would have proved a valuable asset to the professional photographer. The difficulty in regard to the autochrome as a commercial success in the studio is not, of course, because of any fault in the plate. It faithfully records all the colors of any object and it may yet become popular in portraiture, while for the reproduction of paintings, old china, antique articles of all kinds, designs, patterns, etc., it is at present par-excellent.

Where a number of copies are required all the colors in the autochrome can be reproduced in three-color halftone, or collotype, and in fact several firms make this a special line. Collotype might suit, where a fairly large order could be obtained, for portraiture, but halftone, I am afraid would not be satisfactory. Thus the photographer who wishes to work in color must fall back upon three color carbon.

It is possible that the most simple method may be to make an autochrome of the subject and from this make three negatives behind the necessary red, green and blue filters. This method would obviate one of the worst and most trying diffi-

Figure 1.

culties in three color work—the movement of the sitter between exposures. A one exposure camera could overcome this trouble, but unless Mr. Ives's invention, which as far as I know is not yet on the market, is of really practical use there is no other instrument of real utility to professionals. A repeating back containing the filters and plates is the only practical method, and when the light is good all three exposures can be made inside one minute. I can always get better negatives like this taken direct than copying from an autochrome.

In my experience the sitter gets tired very quickly, so much so in fact that there is a perceptible droop in the features even in one minute. In order to hide this as much as possible I make the blue filter come last. The yellow tissue is printed from the negative taken behind this filter, and as the yellow goes underneath the red and the blue tissue on top of both any fading away in expression cannot be detected.

It is not my business to advertise any special brand of plates or filters, but I think it is only fair to say that Wratten & Wainwright's filters and panchromatic plates are absolutely reliable according to the data enclosed in each box. I have tested the speeds twenty times and have never found the figures inaccurate. A beginner cannot do better than follow the instructions implicitly. The length of exposure, the temperature, and time of development are correctly given and no variation should be attempted.

The correct rendering of any color object does not admit of any latitude in neither exposure nor development. You may expose correctly and overdevelop and completely spoil the effect. Over-development is a common error in three-color and also in autochrome work. In both cases it is better to err slightly in the opposite direction. The colors in an autochrome will be more brilliant if the development is stopped say at two minutes twenty seconds in summer weather than if prolonged to two minutes forty seconds as some are inclined to do. In three-color work accuracy in every detail is equally essential.

In regard to the developer for panchromatic plates such hard and fast rules need not be observed. Each worker sooner or later falls into a system and pet formulae. For my part I stick to good old pyro. I can make any kind of negative with pyro by the simple method of varying the proportions of the soda to the pyro. Thus for sharp contrast the proportion of pyro is increased, while for three color work in which the negatives must be soft and full of detail less pyro and more soda will produce the desired result. There are so many excellent developers, such as Rodnal, which require nothing more than dilution with water from the tap to ensure equally good results, that it would be little short of egotism to claim preeminence for any special preparation.

In making up any kind of developer in which sulphite is used it is of paramount importance that the crystals are clean

Figure 2.

and wax-like. If exposed to the air sulphite rapidly deteriorates.

There are several kinds of carbon tissue available and prints can be made equally well by contact in what may be termed the old carbon process, and also by the ozobrome process. This latter has been recently pushed, and doubtlessly improved in the working details, by a company in London trading under the name of the Raydex Co. They make a special tissue and have standardized the solutions to suit the tissue and in other respects simplified the process. By this—ozobrome or raydex—method it is quite practical to use enlarged bromide prints, and thus obtain enlarged color prints.

Figure 3.

Much care is necessary, however, in the manner of enlarging and also in cutting the bromide paper so that the grain runs the same way in each. Otherwise correct register when the color carbon prints come to be superimposed to form the complete print will be impossible.

In a brief article such as this no attempt can be made to go into details of theory and underlying principles. There are several publications which deal with the matter, and if the worker is earnest—and in color work no half measures can avail—he will soon learn the colors of the spectrum and how an object appears red or green or blue to the eye. It is generally believed that in color vision the human eye in the sensation of sight can respond to three colors only—green, red and blue-violet—and these are the colors complementary to the other set of three primary colors—red, blue and yellow—from which all colors can be reproduced. The autochrome screen under the panchromatic emulsion is composed of thousands of sets of tricolor filters which perform the double purpose of a filter in making the negative, and when the same emulsion is converted into a positive, forms the color image.

In carbon printing the greens are obtained by a combination of yellow and blue from the negatives taken behind the blue filter, which is complementary to yellow and from which the yellow carbon tissue is printed, and the negative made behind the red screen which being complementary to blue is the proper filter to use for making the blue print. Green is minus red, and is thus complementary to red, so that red tissue is printed from the negative taken behind the green filter. The set of three prints (Figures 1-2-3) in monochrome which accompany this article may be of interest as showing the relative color value in black and white. Of course double transfer must be employed, but to those accustomed to ordinary carbon work color need not prove difficult. Patience and perseverance are valuable characteristics in every photographic worker. In color these are essential qualifications. The man who "hasn't the patience" must always remain a stranger to one of the most beautiful of photographic processes.

PHOTOGRAVURE

By M. RAOUL PELLISSIER

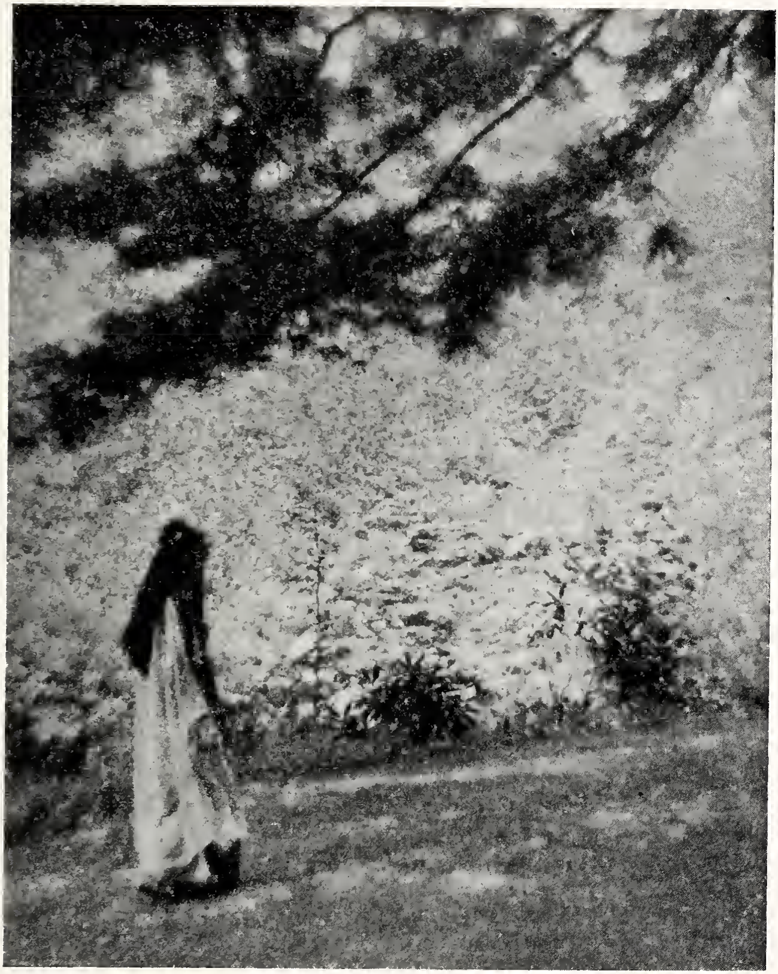
PHOTOGRAVURE is undoubtedly the finest of all the mechanical or semi-mechanical processes and is becoming so well known and sought after that perhaps a few remarks on the process will be welcomed. It is unsurpassed for richness and depth and yet the softest and most delicate details can be brought out, the whole unbroken by the use of any screen.

The first essential is a good negative from which all spots should be carefully eliminated by retouching. As photogravures are made from a positive or transparency this is of more importance than some would think. A print from a negative necessarily must lose something in the printing, and as the print has to be photographed to obtain a negative, still more fine detail is lost.

Now, in a double camera, that is a camera with the lens in the middle and the bellows (square) continued ahead with adaptable carriers in front, we place the negative to be photographed to obtain our *reversed* positive. The simplest way to assure its being reversed is to always make sure that the negative is placed in the front carrier film side out, or glass side towards the lens.

This reversed positive, when dry, should be carefully retouched, all white spots touched out but never so that they appear heavier than their immediate surroundings, as they will in that case be accentuated in the etching, and be difficult to get rid of. Above all put in with a soft pencil a few crisp snappy blacks where possible and the resulting plate will more than pay for the trouble and time. No mechanical retouching after the plate is etched can equal the effect and wearing qualities of the etching itself.

Now, paste thin orange or red paper all around the edge of the positive, the inner edge of the paper being about one-



John Wallace Gillies.

eighth of an inch beyond the edge of the work or picture itself and lay aside for the present.

We must next obtain a roll or pieces of Autogravure Carbon tissue, which comes from the Autotype Co. of London and can be obtained from the American agents, Geo. Murphy Inc. of New York. This is made expressly for this purpose and can be had in various colors. Personally I prefer the No. 3 Burnt Sienna. The object of the colored pigment is simply to enable one to see one's work as it progresses. This tissue is now to be sensitized and for this purpose a solution of Bichromate of Potassium in water must be made according to the directions. This solution should be placed in a deep dish somewhat larger than the piece of tissue to be sensitized and the latter placed therein. It will almost immediately curl up and should be uncurled with the fingers and all bubbles or foreign matter gently brushed off with a flat camel's hair brush. Keep unrolling it from side to side until it lies flat in the solution, but care must be taken never to allow the fingers to touch the surface or the greasy marks so obtained will repel the acid in etching and cause blemishes and much hard work to remove.

This operation of sensitizing must be performed in a dim yellow or orange light preferably in the late afternoon and the sensitized tissue hung up by pins or otherwise in the dark, being dry and ready for use in the morning.

Next, obtain from some reputable concern—I might mention the New York Copper Co.—some special copper made for photogravure. It is specially polished with a very high finish and should be almost as good in reflection as a mirror. This should be of a size rather larger than the paper on which the finished plate is to be printed and must be absolutely chemically clean and free from grease. To prevent tearing the fingers in handling and catching in the towels in drying, round off the edges and corners of the copper both back and front with a medium file first, finishing with a finer one.

Boil up in a kettle a strong solution of potash and water and with the help of a stiff brush and a box of whiting in which the wet brush is rubbed, clean the copper thoroughly, washing under running water and removing the tarnish with a weak solution of nitric acid in water. Have several towels (the common dish towel is best) ready and dry thoroughly and rapidly, breathing on the copper at the last and again rubbing with the driest towel.

A graining box must now be made. This is a square box, the size depending on the size of plates to be produced, made so that it revolves. Any attachments, however, must be on the outside and no rod can be run *through* the box at the centre. A door about 5 inches wide, hinged at the bottom, should be placed about one-fifth of the way from the bottom of the box and level with it four or five rods run across from front to back inside to support a board on which the copper plates are later to be placed. A great improvement for more serious work is a high stationary box with a circular bottom, operated with a fan attachment which revolves and very much lessens the time of the operation.

Now, place in the graining box several pounds of the *finest* ground Bitumen or Asphaltum and revolve rapidly. Let stand for a minute or two to get rid of the coarser particles and then place the cleaned copper plates on a board and gently insert in the box. Care must be taken to eliminate all draughts and any cracks in the box should have slips of heavy paper pasted over them. The fine particles of Bitumen in suspension in the box will settle in about half an hour when the plates can be carefully removed and "cooked" or "burnt in" over a gas stove. This is best accomplished by holding the plate at the corners with pliers or nippers having a flat holding surface. Start by heating from the corners inwards, moving the plate continuously and evenly. It will gradually turn blue but the heating must be continued until in holding the plate down against the light it appears to be of a dull red brown color, uniform all over. The grain may be examined with a strong magnifying glass and each individual speck should be of about the size of the space between the specks.

We now take our sensitized tissue in a dark-room or room with ruby or yellow light and cut it to size, allowing for at least one-quarter inch more on each side than the size of the space within the paper border on the positive. Care should be taken to cut square with a sharp knife and steel rule, preferably on a zinc covered board. Rough edges cause

A DUSTY ROAD. ERNEST A. BRAY.

trouble and cutting square is a great help in getting correct position on the copper.

Purchase a Wynne Actimometer, or printing gauge, and a little experience in comparing the tints with the density of the positive to be printed from will soon enable us to tell how far or to what tint the printing must proceed. It is impossible to tell when the sensitized tissue is correctly printed by merely looking at it, hence the use of the actimometer. Place in the latter a piece of P. O. P. and superimpose the cut tissue on the film side of the positive, taking care to allow it to project evenly on all sides over the edge of the picture itself. This is readily ascertained by adjusting while holding up to a lighted gas jet.

Now, place in the printing frame, using backing of several sheets of white blotting paper and a piece of felt and expose with the actimometer, side by side, but not in sunlight as it tends to flatten the final result. Examine the actimometer from time to time till printing is complete.

While printing is going on fill a deep porcelain dish with pure cold water and brush off any foreign matter on the grained plate with the hand under running water, pour a very weak solution of sulphuric acid and water over the plate to remove tarnish. Wash again under running water and place in the disk. Take the printed tissue out of the frame and with the shades down in daylight, or with the use of a gas jet at night, place it in the water, gently brushing off any fluff or other foreign matter with a flat camel's hair brush. When the tissue begins to uncurl, rapidly place it in position over the copper and remove from the water, removing all superfluous moisture by using a flat rubber squeegee from side to side in all directions. This must be carefully and thoroughly accomplished to make the tissue adhere and to remove any air bubbles. Stand in a rack for ten minutes or a quarter of an hour to set.

Take the same deep porcelain dish and after thoroughly cleaning fill with warm water of a temperature of about 110° Fahrenheit and immerse the plate in this. After a few minutes press the edges of the tissue with the fingers and as soon as the color runs out the paper backing is ready to be removed by inserting the finger nail under a corner and

OCTOBER. A. F. Muhr.

gently pulling it off the plate. Wash away all soluble gelatine by splashing the warm water over the plate till no more can be removed. It is here that the color pigment begins to demonstrate its uses. Then swill under cold water faucet and place in a rack to dry, or if in a hurry place in a dish of pure wood alcohol for a few minutes.

Meanwhile some powdered bitumen should have been thoroughly dissolved in Benzole and diluted if necessary with more Benzole or a little turpentine until of a consistency to run smoothly and easily from a ruling pen. Make it just thin enough to run as if it is any thinner it will spread and do more harm than good. This is commonly known as Brunswick Black.

With the assistance of set squares the plate must now be squared and a mark made in pencil outside the picture beyond the ends of imaginary lines at each side of the picture. These lines must be within the edge of the image as any blank copper beyond that edge will etch black. The lines must only be marked outside the work as if the pencil is allowed to mark the tissue itself, unless very carefully done abrasions will follow. Now, fill the ruling pan and with a steel rule as guide rule around using the above pencil marks. It is advisable to do opposite sides alternately so that when a ruled line is crossed by another ruled line the first has had a chance to set and no blur occurs at the corners. With a brush paint all the exposed copper with the Brunswick Black, care being taken not to allow it to flow over the lines and also to remove all bubbles. Put aside to thoroughly set, which should not take more than half an hour. The more the Brunswick Black is diluted with turpentine the longer it takes to dry.

Obtain some pure Perchloride of Iron (lump) and place in a non-metal jar of any kind within a saucepan of water (water kettle) over a gas heater until melted. When sufficiently cool measure this and add to it half the amount of pure water.

Bordering wax can be obtained from any process supply house, or it can readily be made at home. Soften in warm water, roll on a bench or table till rolled out round and about three-quarter inch in diameter, then press firmly down all around the plate. (Adhering to the bench when rolling out may be stopped by sprinkling thereon common talcum powder.) The height may be increased by thinning out at the top by pressure and at the corners the wax must at least be straight and preferably sloping inwards to prevent the etching solution from flowing over. At the lower right hand corner thin out and form into a lip by which to pour off the acid.

For etching we have our perchloride solution in a measure, an empty cup, a teaspoon and a small vessel containing boiling water. Take the mould as the prepared plate is now called and pour over it some of the Perchloride, care being taken to cover it all over AT ONCE. Flood it and then remove all but enough Iron to well cover the surface. Rock or move the plate so as to keep the liquid in continuous motion as where the acid is at work, if stationary it will deteriorate before the etching is complete. Etching will be plainly seen as soon as it commences as it shows black. An average time that this should be complete in is about eight or ten minutes. It depends very much on the grain—the finer the grain the shorter the etching or the grain will crumble and vice versa. As the etching progresses add a half-spoonful of the hot water from time to time. Place it in the cup and pour off the Perchloride into it so that it mixes thoroughly. Experience alone will tell when and how much water to add. The etching must be gradual from start to finish so that all tones are relatively correct and it is well to pay particular attention to the final tones to ensure getting all the delicate detail. It is better to over-etch than otherwise as retouching for high lights on the plate is a simple matter.

Now, pour off the perchloride and allow cold water to run on the plate to remove all vestiges of acid. Add warm water and allow to stand a few moments when the wax will soften and can be removed. Place the plate on a sloping board in the sink and pour on it hot water and a strong solution of potash and scrub with a brush and whiting, care being taken to obtain brushes that are made for the purpose or scratches may be caused. Wash off under the faucet and flood the plate with a weak solution of nitric acid to remove all tarnish. Repeat these operations until the etching residue and the gelatine are all removed and then dry. Place on a flat surface and with oil and Putz pomade, or any first class non-

CHILD WITH BOAT. FEDORA E. D. BROWN

scratching metal polish, rub until the surplus grain is all removed and the plate is now ready for a rough proof.

Space will not permit me to go into details of printing, retouching and steel facing beyond one or two remarks.

For the printing of photogravures a plate printing press is necessary on which the plates are printed by hand, the paper being damp and afterwards dried and pressed.

For retouching a diffused light is necessary—a paper screen will do—and such tools as scrapers, burnishers, roulettes and dry points. Blacks and high lights can both be added with ease after a little practice, spots and blemishes removed and the plate greatly improved.

When the proof is finally O. K'd the finished plate should be thoroughly burnished on the margins outside the picture proper and quite free from scratches, or these will show in the prints and give the printer endless trouble. The copper is soft and will soon wear out, but a thin infinitesimal coat of iron protects this and must always be removed as soon as it shows signs of wear.

This steelfacing is accomplished by immersing the chemically clean plate in a bath consisting of a solution of sal ammoniac and water to which has been added sulphate of iron, and in which hangs a sheet of iron as an anode. The current being turned on the plate is allowed to hang in the bath for five minutes, then removed and scrubbed with water and whiting, washed and replaced in the bath. This operation must be repeated three or four times until a sufficient thickness of iron has been deposited when the plate is removed and dried very rapidly to prevent rusting and immediately oiled, when it is ready for the printer.

It is a good plan to stamp a number on the back of each plate, keeping an album in which an impression from each is kept for reference with its corresponding number. This should be done just before steelfacing.

In the whole process it is necessary to constantly remember three things: care as to absolute cleanliness, care as to minute details and the use of pure chemicals and water.

I feel that many important details are herein lacking, but space will permit of no more. I shall be glad at any time to advise or help anyone desiring any further complete information.

THE WARNING LIGHT. H. H. BROOK.

A DRENCHING.

Figure 1.

IMPROVEMENTS IN SHUTTERS

By BAYARD BREESE SNOWDEN

AMONG the many recent improvements in photographic equipment there is one which deserves more attention than it seems to have received. This is the notable improvement in between-the-lens shutters. Coming in the wake of the popular anastigmat, these new shutters have been regarded chiefly as one would regard better finish in any higher-priced article, their inherent advantages over the older models being but inadequately stressed. Even the camera manufacturers do not appear to have fully grasped as yet the importance of some of the changes.

The two most notable developments have been in the direction of greater accuracy and greater range. The modern compound shutter, which may be said to set the pace, will give very close to its indicated speeds, whereas the cheap automatic shutters with which amateurs were satisfied up to a few years ago are rather unreliable. With these the listed speed of 1/100th of a second was likely to be nearer an actual 1/60th, while the listed 1/25th was sometimes about 1/40th, sometimes not more than 1/20th. Such inaccuracy is far less common today, even in the more inexpensive shutters. With the increasing use of exposure meters and exposure calculators of one sort or another, guess-work exposure is going the way of guess-work development.

The increased range of the more modern shutters is probably thought of chiefly in connection with moderate speed work, an exposure of 1/200th or 1/300th of a second with

Figure 2.

THROUGH THE WOODS.

an F/6.3 lens on bright days enabling the worker to stop considerable fast action. At 1/250th with a five-inch lens the writer has obtained excellent diving, track, and baseball pictures. However, it is not for its high-speed possibilities that the improvement in range should, in the opinion of the writer, be most thoughtfully considered. Of far greater importance, because of everyday utility, is the addition—perhaps one should more properly say the insertion—of the speed of 1/10th of a second. It is a pleasure to note that a number of new reliable shutters which do not work faster than 1/100th show this indicated speed of 1/10th.

Let us see what a forward step in shutter-construction this really is.

First of all, 1/10th of a second is an entirely feasible hand exposure; not for a child, of course, but certainly for anyone whose hand is fairly steady. The accompanying illustrations are fair proof of this statement. It took the writer quite a while to get away from his deep-set belief that 1/25th is the longest time one can safely give without a tripod or some other support, but numerous hand exposures of 1/10th, with no cases of blur, at last convinced him.

Think what this means. One-tenth at F/8 is equivalent to 1/20th at F/5.6. In other words, hand work which formerly required a fast lens may now be done with the

Figure 3.
ALL IN FROM THE CLIMB.

cheaper F/8 or F/7.5 anastigmat, or, indeed, with the rectilinear. Snapshots in the rain, like "A Drenching" (Figure 1), or in shaded areas where, as in the case of "Through the Woods" (Figure 2), there is no sunshine, are put within the range of the amateur who cannot afford, or for any reason does not wish to lay out money on an expensive equipment.

Not only is this the case, but the pictures may also be obtained with the increased depth of focus that attends the use of a relatively small aperture. This point is in part illustrated by the two pictures referred to, but it is illustrated better by "All in from the Climb" (Figure 3). Stopping down for sharpness of focus in all planes is a pressing neces-

WILLIAM H. RAU. B. J. FALK.

sity in such instances, and the longer the focal length of the lens the farther the stopping down must be carried. If the subject suggests the use of a ray screen, a hand exposure of 1/25th may, in spite of the altitude and open lighting, be out of the question, at least with films. There are very few such compositions, however, which may not be satisfactorily photographed with a hand exposure, with or without a screen, if the 1/10th speed is available.

Of course, while 1/10th at F/8 gives the same amount of illumination to the plate as 1/20th at F/5.6, the two exposures are not otherwise equivalent, for while the former gives greater depth of focus the latter gives greater motion-stopping power, assuming that in both cases we employ lenses of the same focal length. But as we decrease the focal length, which really means as we decrease the size of the camera, 1/10th becomes more and more effective for arresting action. With a post-card camera having a lens of 6¾ inches focal length 1/10th will be of little use in street photography; if people are walking or moving about fairly near at hand, though it will serve admirably for such compositions as "A Drenching" (Figure 1). But with a smaller camera, say 2¼ by 3¼, having a lens of 3½ inches focal length, the 1/10th speed will be almost twice as effective—will be equivalent, to be exact, to 1/20th with a 7-inch lens. And as one gets down into the miniature sizes, with their lenses of 2½ inches focal length, the 1/10th speed has the motion-stopping power of 1/28th with the 7-inch lens.

Consider, then, the versatility of the vest-pocket camera if its shutter shows a speed of 1/10th. The lens, being of very short focal length, will give excellent depth of focus at full aperture. That is, one need not stop it down for sharpness. In addition to this, it may be used to make snapshots in poor light, even if its maximum aperture is around F/8. And, finally, its 1/10th being as good as the post-card camera's 1/25th for stopping motion, it is extremely efficient for all-around low-speed snapshot work.

It is strange that the American manufacturers of cameras have been so slow to group these points and embody the logic in their product. That they *have* been slow is fairly clear. An American-made vest-pocket camera which has been widely

SNOWLADEN TREE—NIGHT. E. L. CRANDALL.

advertised has 1/25th as its longest snapshot speed. Another American camera which has appeared within the year—as handsome and finely-finished a 2¼ by 3¼ instrument as one would care to see—makes the skip in its shutter speeds from 1/5th to 1/25th. Yet this in spite of the evident fact that the smaller a camera the more definitely should it be made for use without a tripod.

However, American camera-makers were never so keen for quality as they are today. The influx of foreign instruments following the reductions in tariff has been to this extent beneficial, for it has shown that enormous as is the demand for a cheap fool-proof camera, there is a by no means insignificant body of amateurs who really know a good thing when they see it. So the quality of the domestic article has been steadily climbing, and the next few years will probably see far greater improvements—improvements in small details and the fine points of camera-construction. What we have needed is such improvement coupled with a more scientific co-ordination of parts, so that the maximum efficiency may be gained from each. This we are getting more than ever before, and it means, among other things, better between-the-lens shutters.

TULIPS. NATHAN R. GRAVES.

LOWER BROADWAY.

JOHN E. BOULTENHOUSE.

GRASS GREEN TONES ON DEVELOPING PAPER

By FLOYD D. PALMER

THE greens of nature reduced to black and white—what a farce they are in a print. The writer has tested practically all toning methods for green tones, and all papers that develop green, and has a process that he believes will give careful workers results that will please. The most critical care must be taken to follow directions faithfully or results will be extremely problematical.

The black and white prints are made, fixed, washed and dried in the usual way, care being taken to get crisp, snappy prints of a pure black tone. Soft grey prints with little contrast do not tone well. The writer has used Cyko for all his experimental work. Possibly other papers would tone as well. Have prints decidedly dark, just dark enough to tone sepia by the re-development process.

Varitone Green Toner, an importation by Schering & Glatz of New York City, is used as the initial toner. The large size package is the one you want, where three tablets make sixteen ounces of bath. Prepare sixteen ounces of the toner according to directions, warm it to 75°-80° and take eight ounces in a clean tray. This is enough to tone eight postcards, or their equivalent in other sizes. The prints are to be thoroughly soaked in warm water and toned in this solution *all at once,* back to back, being kept constantly moving so the solution can have free access to each. Use brilliant white artificial light to work by, 60 watt tungsten or Welsbach gas, are excellent if used close to the tray. The solution is sensitive to bright daylight. The half tones just tone to green and finally the shadows. *Judge the color of the prints under the surface of the solution,* not out in the hand. As soon as one looks satisfactory, drop it into a large pan of water at blood heat. When all are toned throw away the used toner and if others are to be toned continue with the other eight ounces. If used over

SHEEP. RUPERT BRIDGE.

again, or if prints are toned one at a time, the resulting tone is decidedly inferior. The toning time will be from four to eight minutes, depending on the darkness of the print. Under-toning will leave black shadows. Over-toning will result in a loss of contrast and in a yellowish green color.

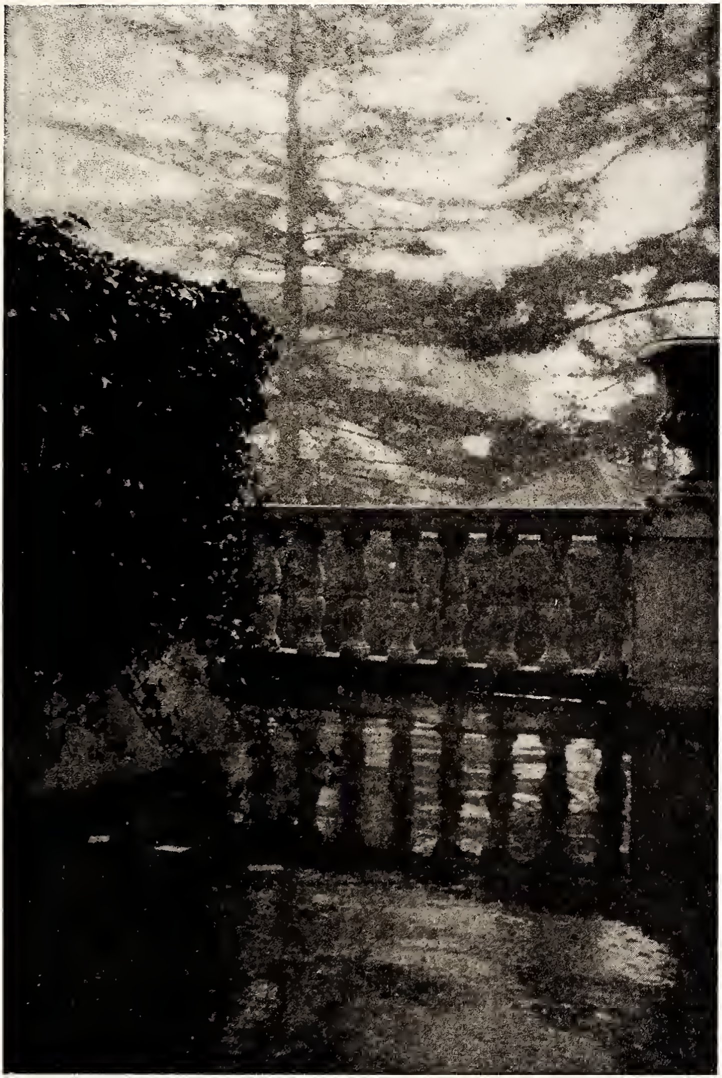
Prints accumulating in the pan of warm water must not lie face to face but face to back, otherwise violent green stains will soak from the shadows of one to the high lights of the other which cannot be removed. The prints at this stage have a rather uniform yellowish green stain in the emulsion so keep them moving in the warm water for five or ten minutes in an effort to wash it out, and then wash in running water for a half hour to complete the work. Finally dry. A slight stain will remain in the white edges and high lights in spite of all you can do, but running water will take it nearly all out.

The tone is now green, but it is dull, so we proceed to brighten it up to a vivid grass green by the addition of *blue*. Soak prints in warm water as before and prepare four ounces of Tabloid Blue Tone (Burroughs, Welcome & Co.). Tone the prints in this, *one at a time,* by brilliant artificial light as before until the green is bright enough to suit. This solution works very rapidly and great care is necessary not to overdo the work, else a vivid blue tone appears that will spoil the result. It will probably be found best to dilute this solution with an equal volume of water to make it work slower.

About twenty seconds is the maximum toning time; ten seconds is nearer the average. When each is toned treat exactly as if they were leaving the green toning bath—warm water, running water and finally dry.

Both toners must be used by brilliant white artificial light. The writer finds he can judge the color obtained best by acetylene as it is nearest to daylight. If a light is used that is yellow, it will be found that a print will look entirely different by daylight.

When dry varnish with any thin celluloid varnish, dampen backs and put under pressure. This layer of celluloid over surface of print keeps the air away from the emulsion and keeps the prints from fading. "Zapore" varnish is recommended by Schering & Glatz. It can best be applied with a



REFLECTIONS AT LUGANO, SWITZERLAND. F. O. Butler.

dropper to all parts, excess being drained off one corner same as treating a negative with retouching varnish, although this is much thicker. The writer has found it best to dilute this varnish with an equal volume of amyl acetate (colorless banana oil) to make it thinner and easier to use.

The tone resulting from this process is a perfect grass green if everything has gone well. The cost of toning is about one cent per print. Although this process is somewhat lengthy the results are worth the time spent. The writer makes no apology for mentioning the names of these two patented preparations, and does not know or care what they contain. They do the work and are worth all they cost.

Trays should be cleaned at once. If the green or blue stain which is always present on them is allowed to dry on it is almost impossible to remove it. Bon Ami applied with a towel while tray is still wet is as good as anything to cut it off.

Prints with white borders are not recommended for this process, as enough stain will be left in the emulsion there to attract attention.

SAMOYEDE PUPS. GILL & SON.

COLOR IN PICTORIAL PHOTOGRAPHY

By H. D'ARCY POWER, M.D.

IN photography in color, to fix, in absolute truth the beauty we see around us, to fill our souls with the glory of the setting sun transcribed to paper, and see again the fresh sweetness of the dawn evolve from the developing dish—this for fifty years has been the dream of the experimenter in photographic science; and the same desires and hopes pervade the general public. Over and over again whenever a passable effect is secured in colored photography we hear the remark, "Very soon there will be no use for painters."

It is assumed by all the laity, and most photographers, that as soon as we can place on paper the actual colors of nature the making of great pictures will resolve itself into a matter of looking for inspiring scenes and photographing them. For centuries men sought for the philosopher's stone that was to transmute base metals into gold, oblivious of the fact that gold in unlimited quantities would not have the value of lead or iron. I am about to show that vain ideals may exist among photographers.

Certain broad facts relative to color in nature must be borne in mind as a preliminary.

First: We cannot by paint or dye reproduce the colors of nature, nor from the nature of the case can we ever do so.

Secondly: The colors we see in nature are only partly due to the actual colors of the different objects (sky, mountain, plain) but largely to their physiological effect on the eye.

Thirdly: Great pictures are very rarely found in nature, and when we do meet with them the pictorial effect is often due to the state of mind of the beholder, which unconsciously suppresses the trivial and conflicting and intensifies what it enjoys.

Let us examine these statements. The first is susceptible

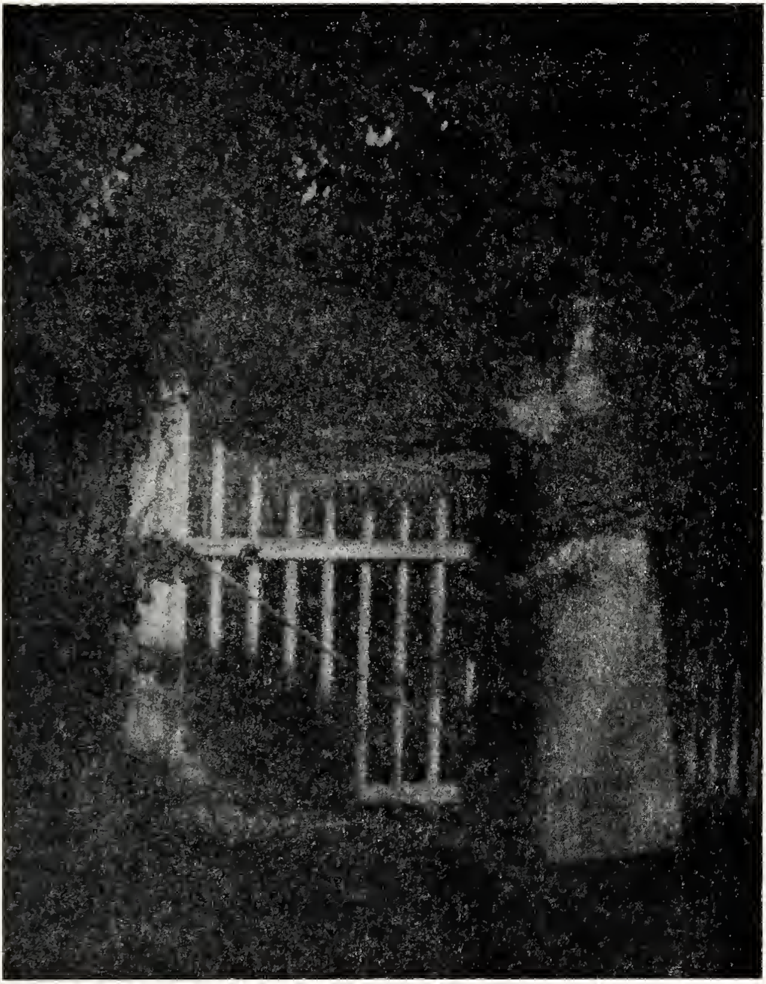
THE LAKE'S EDGE. ARTHUR J. STOCKTON.

of experimental proof. The color of a surface varies with the intensity of the illumination, all colors passing through grey to black as the light fails. As the gradations of light from sunlight to the black of a cavern, are infinitely greater than the possible steps between white paper and black, and in practice are represented by an arbitrary scale, so also must the even greater number of color variations be equally suggested and not reproduced. In still life subjects the approximation may be close, but in landscape picture and reality must always be far apart in light and color scale.

The second statement that what we see and what we think we see are not the same is rarely understood and generally overlooked. The average man is sure fields are green and the sky blue, and the dabbler with paint or crayon so reproduces them, with disastrous effects. As a rule skies are blue only on occasion, and the fields green in early spring, and neither are they as green or as blue as the tyro would paint them. On the other hand, the layman is constantly criticising the painter for putting in a lot of colors that he cannot see at all. "Why do you put green and yellow paint under that lady's chin when her skin is surely white, and blue in the shadow of that tree when the earth is quite certainly brown?" says the lay critic. He is quite sure that if he could paint he would do much better.

Possibly, by-and-bye, this stickler for truth becomes a photographer and takes color pictures on autochromes and then he learns many things. He finds that Angela's ivory neck is compounded of yellow and green, and there is a lot more blue in the shadow of the oak tree than he thought there was. Perhaps he pays a visit to the country and is charmed with a sketch of green foreground, purple brown hills and blue sky. Now is the time to put that artist friend to rout!

The autochrome is duly and correctly exposed but somehow the expected picture is not there. The sky is not blue enough and the brown hills too cold and the green foreground uninviting. The colors must be wrong he thinks. But they are not. If he takes the autochrome to the scene, and making two holes in a piece of black paper so places them that he views the landscape through one and a corresponding part of the autochrome through the other, the colors will appear



EVENING, THE WHITE GATE. Clarence H. White.

alike. Yet the autochrome landscape looks weak and trivial compared with the real thing.

It is clear that reducing miles to inches in the same colors does not give the effect of the original. Should a competent artist paint that same scene he might produce a picture that would bear comparison with its source, but the coloring if compared as before will be markedly different—the sky bluer, the hills a richer brown. The colors are false but the effect is true.

The reason for these, at first sight, remarkable facts is to be sought in the physiological attributes of the human eye. When the eye rests on a given color it loses its sensitiveness to it and gains in sensitiveness to its complementary. For example, if the eye after resting on a patch of green be turned to a white surface the same will appear reddish—the complementary of green. If the surface were red instead of white the red would gain in intensity; or if the surface be yellow, the red sensitiveness would make the latter orange. Should the eye now becoming orange weary be turned to a white surface the latter would take a bluish tinge—the complementary to orange. If it were turned to a blue surface, this color would intensify its blueness.

It thus appears that human eyes not only form their notion of what a color is by its actual tint, but by added tints dependent on what the eye last looked at. In the case we chose as illustrative—the eye turning from the green foreground to the yellow hillside—added the green complementary red, enriching its tint to orange, passing then to the sky its true color, bluish grey, is enhanced by the added blue from looking at the orange, the result to the mind being a much more vivid coloring than the landscape really possesses.

But a reader may say, "You have the same colors in juxtaposition in the autochrome, why do they not enhance one another in the same way?" Because, the autochrome being only a few inches square, it is not possible to look at one color at a time and so change the eye's sensibility. If the autochrome were as many feet as it is inches in size, some such effect would result and the colors seen more vivid. We know this to be true from the practice of painters who do not use the same intensity of coloring in very large canvasses that they employ in small.

To sum up this aspect of our subject, we cannot either by paint or color photography reproduce all the tints and shades of nature. We must represent the reality by an arbitrary scale. Within such a scale intensity can take the place of mass and as in most subjects we cannot paint natural size, so we must increase the intensity of the color contrasts. This is what mechanical methods of color photography cannot do and leads to the failure of color plates when dealing with landscapes. On the other hand, still life subjects such as flowers, fruit, vases and even portraits are excellently represented by the autochrome and similar plates.

The third proposition: that the perception of color is not dependent on the color present in nature, but equally on what the eye is attracted to. This was strikingly brought home to me the year that the autochrome appeared. A near-by house standing on a hill had three acacia trees in full bloom growing round it. It was a gorgeous sight, a mass of glittering gold set in a deep green frame. The field of vision seemed completely filled by it. But, in the autochrome the flowers occupied but a very small part of the total color field. The effect on the eye was the result of selective attention. Just as most people listen only to the singer and have no clear consciousness of the accompaniment, so they equally see in the field of vision only those things they are attracted to. This is the reason that no two artists paint the same scene alike. They see in the form of their attraction and the light of their temperament. The latter statement contains another important, and usually overlooked factor. We speak of a man feeling blue and seeing red. These terms are not devoid of an underlying truth.

Without possessing any degree of color blindness there is good reason to think that all people do not see alike or it may be give attention to the same colors; so we find a painter such as Rubens making red his dominant, and another filling his canvasses with blue. I know an artist of extreme technical skill whose drawing and chiaroscura are perfect, but whose colors are mud. Either these men see differently or they pick from nature that which attracts them. Not only

Figure I.

Illustrating article "Color in Pictorial Photography," by H. D'Arcy Power, M.D.

does temperament control color perception, but so does bodily condition.

Why to most of us does sunrise and sunset seem so different? The sun's rays strike the earth at the same angle and, apart from a not invariable difference in dust and moisture, the air is the same. Yet we all feel a difference in coloring, and every painter expresses it. Are we not seeing practically identical conditions through different eyes? The colors of the dawn intensified to eyes rendered sensitive by rest, the tints of evening softened and saddened by reason of our tired bodies.

These psycho-physiological factors can never be left out of a true *re*presentation of Nature, and until we can make color plates tuned to harmonious receptivity with our souls they will never be rendered by autochromatic color photography.

If the color plate fails to reproduce our impressions, the failure is still greater with superimposed color methods such as the Sangster Shepherd, Pinatype, and the lately introduced Kodachrome. In these processes there are so many difficulties in pigmentation and registration that color truth is rarely obtained and although they permit of a certain amount of personal control by modifying the dyeing, yet the control is of the wrong kind. It affects all parts of the image whereas what is needed is accentuation or suppression at given points.

Multiple gum in color such as the Hoffmeisters, Curtis and others have used is, within narrow limits, much more satisfactory. If the dominant colors of the picture can be covered by two or three pigments, it can, in skillful hands, give very pleasing and natural results; but only a few subjects have this limitation of coloring and the technique is difficult.

A further step in the same direction was made by Alfred Demachy when he produced his method of transferring Bromoil prints to a new basis and worked them up in hard colored crayons. It is stated that he obtained very beautiful effects in this way, but it is obvious that outside of the lens drawing, photography is largely eliminated from the result.

I have so far not referred to colored photographs because as usually made, by tinting with dyes or water colors an ordinary photograph, they have no value, and can have no value as works of art. As the silver image is not affected by the color, every tint is degraded by it, and the result has the dead untrue appearance we are all familiar with.

The use of oil colors, owing to their opacity, destroys all photographic values and texture, and unless applied with extreme care effaces the drawing.

The destructive criticism I have been compelled to apply to existing methods of color photography led me some years ago to seek color results along another line. In the making of a picture there are four elements:

1. Line, i. e., outside, or shape.
2. Tone, light and shade contrast, chiaroscura, mass.
3. Color, contrast, i.e.: The contrast between the effect of warm colors; as, yellow, orange, red; and cold colors, as blue violet, green.
4. Color, harmony, i. e.: The effects of color blending.

In the order here given it is possible to satisfactorily present an object or scene by 1, or 1 and 2, or 1-2- and 3, or from all elements—the picture gaining in completeness with the addition of each element. Thus an outline drawing, Phil May's pen sketches or Whistler's etchings, may entirely satisfy. Add the element of tone and we get the greater reality of a charcoal or wash drawing.

The division of color effects into two distinct qualities, the temperamental contrast of warm against cold colors as distinct from the beauty of color combinations is not generally recognized, but it is very real. A picture painted in two tints only, one warm, the other cold, will produce an entirely different impression to the same subject in monochrome; and, in many cases, if the distribution of the warm and cold tints be made to correctly approximate the same class of colors in the actual scene, the effect will often be so realistic as to almost compel a belief in the existence of many colors in the picture. This effect is only possible when the two tints employed are tertiaries; that is, neutral tints compounded of the three primary colors. Thus in my work I employ a blue gray against a terra cotta. Primary colors or secondaries placed in contact are too glaring in their contrast.

This matter of fundamental color contrast is very important in the making of a picture. It is more powerful in controlling composition than line or tone. Given a picture in black and white whose lines or masses fail to please, if the element of color contrast be added in a direction concordant with the effect desired, the eye will desert the original composition lines and follow that of the color contrasts. I will presently show how valuable this color dominance may be in correcting the unavoidable deficiencies of lens drawing. It led me several years ago to seek a method of converting at any point desired the silver image of a bromide print into contrasting tints.

I published several methods for doing this (See Camera Craft, Oct., 1909). Seven years' experience over every class of subject has convinced me that the method dependent on locally bleaching the desired areas of warm tint with the ferricyanide and bromide mixture, sulphuretting, and final gold toning is in every way best. It gives warm tints running from flesh ochre to red chalk (or if desired from yellow ochre to dark sepia) in contrast with blue black in the cold darks to gray blue in the lights. It is possible to secure every degree of sharpness or diffusion in the contrasting masses—also intermediate tints by partial bleaching or partial redevelopment.

I have previously described in the annual (American Annual of Photography, 1909) the method of mechanically modifying values and even line in bromide prints. The combination of these processes affords a control such as no other method can approach.

Necessarily, as in any branch of art, the technique for good work, especially in landscapes, requires study and application and the making of a picture of any complexity will demand time. But these being acquired the *ARTIST* can use the camera and chemicals as the painter uses paint to convey his own conception of the thing pictured.

The control passes from the machine to the man. To those who have not seen the results it is hard to convey an impression of how great is the advance in interest of pictures in two tints over black and white. In many cases where the true color relations have been accurately maintained the mind seems to supplement the actual tints so that an impression of a full palette is received, and competent artists have expressed surprise on examining the print to find only two colors present.

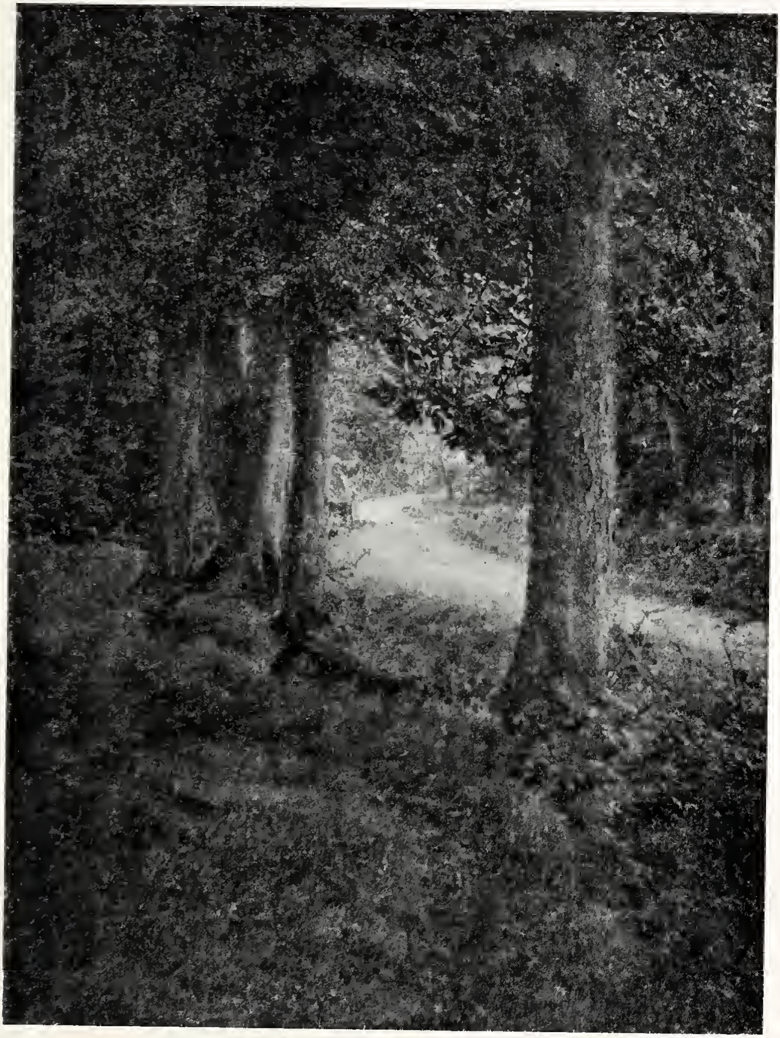
PORTRAIT. WM. SHEWELL ELLIS.

Having thus obtained control of the three primary elements of composition—line, mass and colór contrast—I have recently sought access to the fourth—namely, color harmony with a full palette. I have already explained that colored photographs are of little value because the presence of the black silver degrades everything, but when that image is converted into blue grey and reddish yellow corresponding in one case to greens, blues, and violets, and in the second to yellows—orange and reds—we have a color basis of exactly the same nature as that employed by the painter in oils for the final development of his picture.

It is unnecessary to relate here my attempts to utilize this basis, but the final result was, that using the right brand of bromide paper (P. M. C. No. 3) I obtained a surface that held pastel color perfectly and thereon can be built up a picture showing every possible nuance of color and tone and possessing characteristics that set it apart from other forms of pictorial art. It has all the good points of a pastel and atmosphere and softening of outline are under perfect control.. If necessary details can be entirely suppressed; but and this is the important point, the usual flat and structureless surface of a pastel picture is replaced by the full beauty of texture that the lens alone can give.

In a general way mixed methods are anathema in art, the reason being that the composite character of the work is not blended and attracts attention from the subject; but in this case the union is perfect and the product is a new creation having its own place as a medium of expression. This statement can only be verified by an exhibition of results, which I hope to give. Of course the technique here outlined is no simple affair. It assumes a general art knowledge, especially the thorough understanding of chiaroscura and coloring and the ability to build beforehand, and hold firmly in mind, the final result during the intermediate stages.

The technique of chemical toning in two colors must be acquired as it is the color skeleton of the picture (N. B. Pastel overlying a straight black and white print is little better than dye or water color) and the laying on and partial fixing of the final colors has a technique of its own which I will later describe. I hear the remark, "Why not paint in oil



IN THE WOODS. Thomas Carlyle.

or water colors?" Because, and this is the only reason for using photography as an art medium, because there are qualities which neither oil nor any other medium can reproduce with the truth of the lens and sensitized paper. These are not sacrificed by either the double-toned or the pastel print. Preserving the excellencies of photography more perfectly than gum or bromoil, it leaves the artist free to express himself through his work to a much more unlimited extent.

I believe the foregoing analysis justifies the conclusion that color photography by the direct registration of the color of the objects can only be of limited service in the making of works of art. That success in this direction is possible, but must be looked for along lines that leave the artist master of the field.

THE WINDJAMMER. NEWELL E. COLLINS.

SOME EXPERIENCES IN GUM

By ALLEN P. CHILD

THERE is a certain June day of a couple years back that I always recall with the most poignant of pleasure. I had been in a down-town news store and had bought a late copy of some photographic magazine. Going home on the car I glanced over it and found an article on Gum Printing. I thought that my appetite for black and white prints had been fully satiated, and I knew at once that I had come to that place which every amateur reaches at some period of his photographic career. I was thoroughly convinced that I wanted prints in color. This magazine article sent me on a long reading tour through the magazine files and books on Photography in our Public Library until I was quite saturated with the various processes by which prints could be obtained in color. I was worried night and day, during this reading program, over which process I should start on. I was anxious to get things going and to see what could be done. But I had found out before that a thoroughly systematic course of reading along any line of photographic work, before actual labor was commenced, would always bring better results and bring them quicker.

I have never been able to figure out why I should have chosen Gum as a color process. It was not because of its apparent ease in manipulation. I had never seen any Gum Prints by any experienced workers, or for that matter none of any kind; I just seemed to feel that it was the only way I could get the results I wished.

I could hardly wait to get started on the printing after my decision and the two days that I waited for my Gum Arabic to precipitate were mightly long ones. I was annoyed at the start because some of the articles I read had put special emphasis on the assertion that nobody could make a pleasing Gum Print from a 4 x 5 negative directly. I had nothing

MAUD ALLAN. CLARENCE H. WHITE.

larger than a 4 x 5 camera, knew nothing about enlarged plates or enlarged paper negatives, and did not have sense enough to go to a supply house and rent a 5 x 7 or an 8 x 10 camera and take a week to get pictures that would make good Gum Prints. And let me say here that if you take a picture with the intention of making a Gum Print of it you should study thoroughly on the ground-glass the special scene which attracts you. The various colors, their differing tones, the foreground and distance must all come in for their share of attention. You should try to carry a very vivid image of that landscape home with you; the impression you received from it should be recorded in your prints.

Despite my perturbations my first successful Gum Print was printed direct from a 4 x 5 negative. I remember that I put a very heavy coating of Gum and color on the paper, and a very small proportion of Potassium Bichromate was added which made the printing process somewhat longer. To add to my difficulties I left it printing in a window the very best part of one day and the result was that it developed mechanically in cold water for twenty-four hours. But the beauty of the print passed all my expectations. And I have never been able to duplicate that certain print in either color or gradation of tones. For that reason and that it was my first real print it is dear to me.

I find that the colors best suited to this process are the Devoe and Reynolds Florentine Fresco Colors, and care must be used in mixing powdered colors so that the darkest color will not leave streaks on the coated paper.

The best brush to coat the paper that I have found is a Devoe's Double Thickness Square Fitch Flowing Brush in about a two inch width. Its bristles are set in Hard Rubber and one brush has lasted as long as nine months with almost daily use. Some workers advise the use of a badger hair blender to smooth over a coated sheet, but I have never found it necessary in my work.

A rough surfaced paper holds the color much better than a comparatively smooth surface, but detail must be sacrificed to some extent in using a rough paper. Strathmore or Michallet Charcoal papers are the best for rough paper work and a light weight of Whatman's cold pressed paper will be

SPRING FLOWERS.

found somewhat smoother than the charcoal papers. I have left prints on Strathmore paper soaking in water as long as two nights and three days without the slightest appearance of disintegration and I believe that this is a great test for the adaptability of any paper to this process. And on top of all this I have printed this same sheet, which had such a soaking, a second and still a third time and had no sign of shrinkage. The paper was not sized and I rarely size any of my paper, and am still able to keep away from disagreeable overlappings of color in the print.

I tried to dry my first prints on a large blotter and woe was mine to begin with. The water soaked print would soak the blotter and the blotter would invariably dry out first and in doing so would hump up and take the print along with it. As the result of such contortions the still wet gum would follow the path of least resistance and commence to run away from the middle of the print to sundry edges and corners of the paper. In desperation I had to figure out some other way of drying, so now I place the wet print face up on a dry sheet of glass and place the glass on an absolutely flat surface where there would be no chance for even a slight tilting of the paper and everything works lovely.

The process of Gum Printing is one that contains a chance for never ending study of a great many different things and to the amateur or professional who is awake and wants to stay awake, who is willing to persevere and has patience, there is no process which has so much to offer in the way of ultimate successes. For the recording of individual impressions of some beautiful touch of nature, little essays and poems in color, this process has no peer. To the worker in photography of high ideals, broad thoughts and sympathetic minds this Gum Process holds out the sceptre of infinite possibilities.

Figure 1.

THE COASTERS.

KODAKING MOTION

By C. H. CLAUDY

"OH, I'd like to do speed work—it's fascinating! But I haven't the equipment. All I have is a little pocket kodak."

So say, in effect, if not in words, untold numbers of amateurs, who admire the snapshots they see in the weekly papers, and, at the camera club, gaze in wonderment and awe upon the owner of a speed camera. Several hundred dollars worth of lens and shutter, box and experience seem to the button presser to separate him from the joys of snapshotting so speedy that blurs are an unknown quantity.

Figure 5.

THE JUMP.

Illustrating article "Kodaking Motion," by C. H. Claudy.

But there is no reason why the owner of a little kodak should not make snapshots of fairly rapid motion, if he will be content to use the instrument he has with a strict regard to its capacity and with a little knowledge of some elementary laws of optics.

That this is so, the collection of little snapshots which accompany this story amply proves. Incidentally, let is be said that they are included here for what may be learned from them, and not for their beauty.

The average owner of a small pocket instrument, folding

Figure 2.

WOODY LANE. BY ALICE F. FOSTER.

kodak or box camera tries once or twice to photograph an automobile going at sixty miles an hour, a base runner diving for second, a fire engine dashing to the alarm. Finding that the fastest speed upon his shutter—probably one hundredth of a second or less—results only in a blurred outline, he concludes that no snapshot he can make will "stop" the motion and "freeze" it upon his film.

If he had decided that no snapshot of rapid motion at right angles to it and close up could be made by his instrument, his conclusion would be accurate. And in the avoidance of the conditions suggested in those two phrases, "right angles" and "close up," lies the secret of making good snapshots of rapid motion with a small kodak never designed for speed work.

For, strange though it may sound at first, it is *not* the speed of the object you would photograph with which you are concerned. It is the speed of the *image of that object* across the sensitive surface of your film which interests you. If it were possible for it to move rapidly in life and stand still on the film, you could make a time exposure of it and still get it sharp.

That is an exaggeration, of course. But it is perfectly possible for a railroad train, moving sixty miles an hour on its track, to be a subject for a good picture, made in the hundredth part of a second, during which time the train has moved nearly a foot.

Figure 3.

IN FLOOD.

This apparently magical result is accomplished by taking the picture in the line of motion, either as the train comes directly towards or goes directly away from you. In such a position, while the train is passing *over the track* at sixty miles an hour, it may be travelling *across the film* at a very, very slow rate indeed. Rather is it merely "growing" in size as it travels, as far as the film is concerned, and the one foot forward movement it makes during the exposure results in a sidewise movement so minute it is never seen in the photograph.

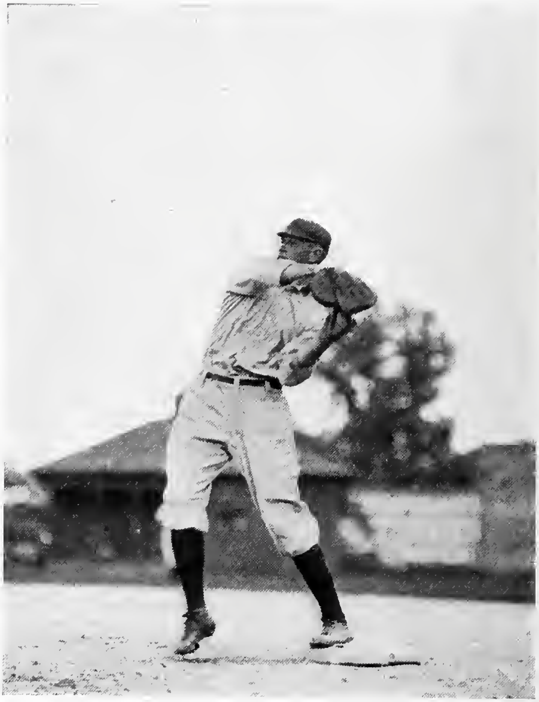


Figure 4.
LEFT HANDED HAL CHASE.

So the first principle—and very nearly the last one, too—for him who would make a speed picture with a pocket kodak is to get in front of or behind the line of motion, or as nearly in line with it as possible, and make the picture from that standpoint.

For instance, the little picture called "The Coasters," (Figure 1) by Mr. A. T. Strong, shows boys coasting on a novel form of single runner sled. But the motion, presumably rapid, is almost directly towards the camera. The shadows in the snow, the light color of the tree trunks, show an ample exposure, yet the figure is, to all intents and purposes, sharp and clear, and the slight blur of the flying snow, which has motion *at right angles to the camera,* rather adds to the attractiveness of the picture than otherwise.

O. C. CONKLING.

The little snapshot of a moving automobile in "Woody Lane," (Figure 2) by Alice F. Foster, is another example. Presumably the car is not going more than twenty miles an hour. And it might just as well go sixty for all the difference it would make to a hundredth of a second snapshot from behind. Here, again, a full exposure is indicated by the tones of the picture, and, because of the shady character of the road and the absence of shadows, presumably at least a tenth of a second exposure has been given. Yet the automobile is not blurred.

Every one is familiar with the oily character of streams as pictured in slow snapshots, when the water runs into a continuous blur during exposure. The result is not like water, and hence not pretty. But sharp water pictures, even of tumbling rapids, can easily be made if you photograph them tumbling *towards* you, rather than at *right angles* to you, as instanced in "In Flood," (Figure 3) in which rapid motion is sufficiently sharp in the twenty-fifth of a second needed for complete exposure in this kodak snap under a leaden sky.

There is one other little point for him who would make his kodak act like a graflex—take intermittently rapid motion during its instants of momentary rest. For instance, Hal Chase, left handed first baseman, is here shown just getting ready to make a throw. (Figure 4.) There was one little instant between the dumping of the ball from mit to throwing hand, and the actual throw, when he was practically stationary. That moment the kodaker chose to snap his shutter. The result is a picture full of life and motion, yet not blurred.

Finally, there is the snapshot in which a blur adds, rather than detracts. Of this "The Jump" (Figure 5) is an example. Everything here is clean cut and sharp but the central figure. The little lad who is so bravely jumping from the float to waiting arms is blurred. But the blur is not unattractive—it speaks of motion and splash. And because the snapper waited until the little body was partly in the water before snapping his hundredth of a second shutter speed, the blur is not great enough utterly to spoil the picture.

Thus, the points to remember in kodaking rapid motion are these:

1. Get in the line of motion.

2. Don't try to picture fast motion too close.

3. In Intermittent motion, choose the instant of reversal of effort, or the moment of stillness, for your snap.

4. Don't be afraid of a little blur when most of the picture will be sharp.

Follow these simple rules, and you can make of the little kodak, if not an actual speed camera, at least a very good substitute for the one the discouraged amateur keeps shut in his pocket because, "Oh, it won't stop any motion at all—I've tried it!"

A ROCKY MOUNTAIN LAKE. J. C. HEGARTY.

THIRTY YEARS AGO

By CHARLES E. FAIRMAN

IT may be that I will be photographically ostracised for using a subject of this kind, or perhaps better stated, for writing about photographic matters of three decades ago, but as this is an anniversary year for The Postal Photographic Club, of the United States, I am sending herewith two pages (Figures 1 and 2) from the first album issued by this club, an album issued April 29, 1885, and hope that this simple story of one of the unique photographic clubs of this country may prove of interest to the members of the photographic fraternity who have for many years watched for the advent of *The American Annual of Photography*.

This first album of the Postal Photographic Club is a modest, unassuming publication. Its extreme measurement is 8 x 10 inches, the pages are fastened into the board covers with a durable shoestring lacing, and the covers of board have been given a finish with an orange colored muslin, suggesting in this color scheme the safe light of the dark-room, as the album was to be forwarded by mail (hence the name, Postal Photographic Club). Nothing could be included which would be construed as outside of the class of "printed matter," therefore the circulars of instruction, and all of the information concerning the prints enclosed, was prepared upon a duplicating machine, thereby complying with the postal regulations and saving the classification of the album as first class matter, subjected to letter postage.

It may be of interest to some of the "old timers" to know that in this album of thirty years ago the pictures were all made without the aid of anastigmatic lenses, color screens, ray filters, or focal plane shutters. In fact the data accompanying this album shows that nearly all were in the habit of using the lens at an aperture of F/32, or F/64. Three of the prints are upon platinotype paper, the remaining sixteen are printed upon that old standby, albumen paper.

Figure 1.

LANDSCAPE NEAR AURORA, N. Y. BY PROF. E. L. FRENCH.

Illustrating article "Thirty years ago," by Charles E. Fairman.

From the information furnished with the print data I find that photographic plates bearing the names of Forbes, Eastman's Special, Carbutt B. Cramer, Norden, and Mawdsley were used. One of the members, Prof. E. L. French, seems to have been the ideal amateur, for the pictures contributed by him were made upon plates of his own manufacture. This fact has induced me to include one of his pictures (Figure 1) with the illustrations for this article.

The members of the club who contributed to this initial album of thirty years ago were A. H. Sherman, C. W. Canfield, H. McGill, Prof. E. L. French, Randall Spaulding, J. E. Dumont, Jas. M. Rich, and Jos. S. Rich. C. W. Canfield was the president of this organization, and Jos. S. Rich, the secretary and treasurer.

Possibly you may say that there is nothing startling or unusual in all that has thus far been written, and that photographic albums of thirty years ago are by no means extraordinary, but the interesting part has not been written—this photographic society has maintained a continuous existence for over thirty years and is still issuing its monthly albums, with note books for criticism, and is, notwithstanding the strenuous hurrying times in which we live, holding the interest of a select class of amateurs scattered through the New England, Middle and Southern States.

While the original name, Postal Photographic Club, has been retained, the organization no longer belongs to the postal class. It was soon determined that it would be better although more expensive to send the albums and note books by express, and now the monthly round of the current album (accompanied by an album issued some six months earlier, in order that the full text of the criticisms may be seen) is an event looked for by the enthusiastic amateur who may be widely separated from photographic associates, but who through the medium of the album is able to keep in touch with some of the best amateur photographers of the eastern section of the country.

All of the time we are touching photographic hands across miles of space and reaching those whom we never see except through the medium of their work and correspondence; not because we are stay-at-homes, or belong to the hermit class,

Figure 2.

HARPERS FERRY, W. VA. BY JOHN E. DUMONT.

Illustrating article "Thirty years ago," by Charles E. Fairman.

but that in our reunions it has been impossible for all of the members to assemble, and I think it safe to say that in the membership of forty, a limited membership, there is no one member who has seen all of the remaining thirty-nine.

And so I turn to this album of thirty years ago, and I feel in my heart of hearts that this small number of early amateurs who successfully organized a society that has lived, grown, and been a means of help to hundreds who have followed the trail they were blazing, were pioneers and pathfinders of whom Photography may well be proud.

LAKE ON MT. BALDY, CAL. ROBERT L. CALKINS.

CHILD PORTRAIT. IRA D. SCHWARZ.

THE SPORTSMAN'S CAMERA

By STILLMAN TAYLOR

THE market is so plentifully supplied with cameras of our own as well as foreign manufacture, that the inexperienced photographer is as likely to choose an instrument ill adapted to his particular needs, as he is to make a wise selection. For general snapshotting any one of the hundred and one kinds of cameras are being used, but the sportsman's requirements are not so easily met, since there is rather a wide difference between snapping views about town and country and making pictures in the wilderness—the difference existing in weight and bulk and the rather exceptional condition under which outdoor pictures must be often taken—for the sportsman often finds that the subjects he most desires are frequently the ones which tax the excellence of his optical apparatus to produce.

The question of size may be easily disposed of because the sportsman is more concerned with the quality of his views rather than their dimensions. The plate camera is naturally outside the pale of consideration; it is too heavy and bulky for packing in the woods. Our choice then narrows down to the more compact cameras using roll films or film packs, the merits of each system will be considered in due time.

Just now we are considering the importance of picture size, and since size and weight with bulk are synonymous so far as cameras are concerned, and as the sportsman wants a camera that he can "tote" wherever he goes, my experience suggests that nothing larger than a 3¼ x 4¼ size be taken to the woods. This size is ample to show up well when the contact prints are mounted in the album, and if taken with an ordinary lens the negative will stand enlarging up to 5x7 inches without alteration, and may be worked up to 8x10 or even larger if wanted. However, the 5 x 7 print is as large as ordinarily desired, the larger sizes only being occasionally de-

NOVEMBER ON THE DUNES. Rudolf Eickemeyer.

sired when the photograph is to be framed. The 3¼ x 4¼ size may then be regarded as the maximum size for the sportsman, and taking this as the logical starting point in our discussion suppose we look up its actual weight and bulk. For our purpose suppose we select at random one of the popular medium-priced cameras—the No. 3 Folding Pocket Kodak. This camera measures 7½ x 4½ x 1¾ inches, and weighs about 23 ounces, being regarded as one of the most compact and lightest cameras in this particular size. But does the sportsman need a camera taking so large a picture as this? I think not, and from my own considerable experience in lugging around various sizes and makes of picture-making boxes, I can recommend without hesitation the 2¼ x 3¼ size as plenty large enough for use in the woods.

The advantages of the small camera do not alone exist in its more compact and light form, but it has optical advantages which the larger cameras do not possess for the sportsman's use. The small camera possesses a short focus lens, which does not require focusing to reproduce a sharp image when the object is six feet or more from the camera. The films for the small camera are much less costly, and the camerist can snap several views for the same amount expended in securing but one in the larger size. Cost may thus be kept well within modest limits and since the films take up much less room in the camping kit, a larger supply of camera ammunition may be conveniently stowed away in the same space.

The matter of a lens is an important consideration, and the first thing we should know about is its focal length. While there are several accurate methods of determining the focal length of a lens, it will suffice to mention that the focal length of a single lens of the "fixed focus" type is the distance between the lens and the film when focused at a distant object. In the double or "rectilinear" lens, the distance between the diaphragm or "stop" and the film, when the lens is focused at distance or infinity, is the approximate focal length of that lens. This is called in photographic parlance the "equivalent focus," and is of course in due proportion to the size of the film to be covered, in order to produce a clear, sharp image of the object.

Let us inquire into this matter of focal length by looking up the optical equipment of the more popular cameras. In the camera taking a picture 1⅝ x 2½ inches, the lens commonly provided is of 3 inch focus. In the 2¼ x 3¼ size the lens is of 4-inch focus, while the 2½ x 4¼ and the 3¼ x 4¼ cameras are fitted with lenses of 5-inch focus, and the post-card size, or 3¼ x 5½, is fitted with a 6-inch lens. To get a clear idea of the optical advantages and limitations of these cameras, we have but to read a few pertinent optical facts.

Figure 1.

1—The shorter the focal length of a lens, the greater is the depth of focus or depth of field—which simply means the area in which the image is most clearly and sharply defined.

2—The larger the stop or lens opening, the greater is the rapidity or speed of the lens, and the shallower is its depth of field.

3—Hand cameras are provided with a minimum shutter speed, and this cannot be exceeded, or the slight movement of the hands when holding the camera will throw the lens out of focus and the picture will be blurred. It is thus seen that the

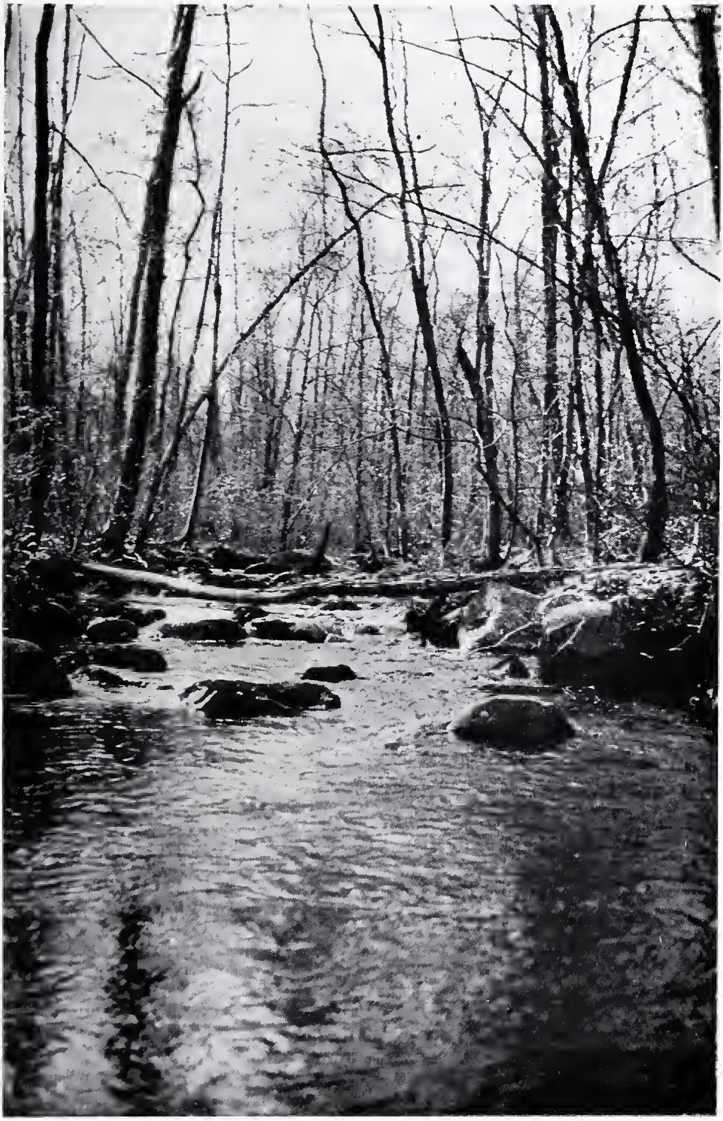


Figure 2.
Illustrating article "The Sportsman's Camera," by Stillman Taylor.

lens must be used wide open with its largest stop, in order to admit sufficient light during the brief movement of the shutter.

Now supposing you want to snap a photograph in the shade of the woods, in the early morning, late afternoon, or on a dark day. If you have a tripod or can improvise a rest for the camera, you can get the picture by time-exposure—that is, uncovering the lens long enough to admit sufficient light to the film or plate. But time-exposures can only be taken of stationary objects—no moving objects can be shown, or the picture will be blurred. If we desire a clear picture of a moving object, or snap any view by holding the camera in the hands, the only way to do this is to have a lens that can be opened up wide enough to illuminate the film. If you have a rapid anastigmat lens you may be able to do it, otherwise the time-exposure is the only possible way.

If your camera takes a 2¼ x 3¼ picture and is fitted with a modern anastigmat lens with an opening of F 4/5 with a 4-inch focus, all objects at 33 ft. and beyond will be in sharp focus, and if the lens is sharply focused at this distance, all objects are in focus at half this distance (17 ft.) on up to infinity. This middle point is the "hyperfocal" distance of a lens, and if you happen to be using a 6-inch focus lens with an opening of F 4/5, all objects at 67 feet and beyond will be in focus, and objects at half this distance will be sharply defined. To get a sharp focus at objects lying closer to the camera than this, the focusing scale must be consulted, or the picture will be out of focus and blurred.

For the sportsman's camera, an anastigmat lens is a necessity, because pictures if made at all must often be taken under unfavorable conditions, and the cheap and slow lens cannot do this. The sportsman's requirements is one of those cases where a large opening is frequently essential; it makes the difference between success or failure. Rapidity is therefore the chief point to consider in selecting the lens for sporting purposes, and lens speed is synonymous with lens opening. Thus any particular lens working at an opening of F/8 is just as rapid as any other lens working at the same stop opening, and all lenses working under the same conditions will require the same exposure with the same stop number. There is a simple rule for calculating the exposure of

FAGGOTS FOR SALE.
Nuremberg, Germany.

F. O. Butler.

any stop or any lens; the exposure with any particular stop is one-half of the next one smaller and double that of the next one larger. For example, if stop F/64 requires one second's time, the next larger, F/45, will require but one-half second, F/32 one-quarter second, and so on. To fully meet the varying conditions under which the sportsman must procure his pictures, a fast anastigmat lens working at an opening of F/4.5 or F/5.6 is the most satisfactory choice. There are many fine lenses on the market, and their merits may be summed up by saying that their real value is about proportional to the price.

For a beginning one may choose a compact camera taking pictures 2¼ x 3¼ inches. The roll film is the simplest and least likely to be fogged in development, but the film-pack has many points to commend it. The roll film cartridge must be developed after all the pictures have been exposed, while the film pack may be easily separated and the last film taken out for development without spoiling the others. Another good feature about the film-pack is the convenience by which it may be used in the regulation glass-plate cameras. By using a wooden "adapter" the film pack may be affixed to the camera and removed at any time, by simply inserting a wooden slide to cover the sensitive film, thus allowing the serious worker to focus the view on the ground glass. Again, filmpack cameras are more compact than the roll film boxes, and the packs are merely flat packages of films folded in a light proof envelope and occupy the minimum of space in the camping kit.

Among the most finely finished and expensive cameras are the Goerz Tenex, the Adams Vesta, the Voightlander line and the ICA models. Practically all of these cameras are made for plates and film-packs, and considering the careful workmanship and rare photographic excellence their price is by no means excessive. A splendid little camera for the sportsman's use is the Aton Model A, taking pictures 1¾ x 2⅜ inches, and using film pack or plates. The price with Hekla Anastigmat F/6.8 lens and shutter is about $25, and the camera is worth it. Another good camera is the Eastman Vest Pocket Kodak, using roll films and making a picture 1⅝ x 2½ inches. Equipped with a F/6.9 Zeiss Anastigmat lens, it sells for $25. I have used both and unhesitatingly recommend them. Should the sportsman care to go a bit higher, the Zeiss Bebe, taking a picture 1¾ x 2⅜ inches, and using film packs or plates may be selected. This camera is finely made of aluminum, is very compact and light in weight. Still higher in price are the reflecting cameras, such as made by Folmer & Schwing and the Eastman Co. in this country, and well known Ipsco of European manufacture.

With one of these cameras in his outfit, the sportsman is not likely to fail to secure a fine collection of photographs on his trips to the woods, and by making use of the convenient tank development for his films, all the fuss and bother is left out and he can finish up his own negatives if he cares to. Enlarging too is yet another phase of photography within the reach of the amateur, and even the small 1⅝ x 2½ inch negative may be enlarged up to 5 x 7 size without losing its perfect detail and sharpness. The writer has used one of these small cameras for several years and a glance at the illustrations (Figures 1 and 2) given will show what the average man can expect from a good small camera, tank development and an inexpensive enlarging camera.

GRAND CANYON, ARIZONA. WILLIAM S. RICE.

A SUMMER AFTERNOON. W. A. WARD.

WHY WAS REMBRANDT?

By SIDNEY ALLAN

IT was at one of the State Conventions, in a small one hotel town, quite a number of years ago. It was near midnight, and we had been doing what is generally done at Conventions when the evening session is over. By that time we had broken up into smaller groups, many had turned in, but three of us—as I do not wish to disclose names they will have to pass as the president, my friend of Allendale and myself—were out for a stroll.

As we were proceeding along Main Street and around the State House, the President suddenly barred our way, right in the middle of the trolley track, under a huge arc lamp. He was a spacious personality, looking somewhat like a stout village politician, and there was no getting around him. It was a regular hold up. And before we had realized what was happening, he had fired at us the profound and at this hour utterly unreasonable question, Why was Rembrandt?

My friend from Allendale looked at me and I looked at my friend of Allendale. "A curious question," I laughed, "you could just as well ask why was Shakespeare, why was Washington, why are submarines, why is Roosevelt?" "I am not joking. You are a smart man. You ought to know," said the mountain of flesh, completely ignoring our discomfort of standing there in the middle of the street. "Why, Rembrandt was a great painter. As long as there is art there will be painters, and some will be better than the others. Rembrandt was one of them."

The leviathan form grunted repeatedly as if he were greatly dissatisfied, and blurted forth, "that is no explanation at all. Now, give me a real explanation." Well, I realized that we were in for it, and I began to wonder what strange and vague and rudely shaped idea bothered this man's brain. So I suggested that we would continue our walk and I would try my

SADAKICHI HARTMAN. J. C. STRAUSS.

best to elucidate matters for him. "No, right here," he insisted. So I threw up my hands, pulled myself together, gradually warmed up to the subject and delivered myself about in this fashion.

"As you ask this question, you must have a reason for asking it. Let us get at that first. No doubt, his name means something to you as to all of us. You may have never seen an original, yet you are impressed by his lighting, or by his picturesque style, or the way he renders character and facial expression. No matter what, you admire something in him and wonder how he came to do it.

"I believe, it is generally conceded that he is about the greatest portrait painter of them all. He is finer than Raphael, Titian and Veronese. It is a toss up when it comes to Velasquez. He is more spiritual than either Rubens and Franz Hals, and more perfect technically than Raeburn, Reynolds and that English bunch. Now, why did he reach this high standard of perfection?

"Holland was at his time the supreme commercial and sea power in the world. The aristocracy had given away in power to the commercial men. The latter were flourishing and art was patronized. Titian never portrayed anybody below a count. Only the clergy and nobility had hitherto indulged in this luxury. Now, everybody wanted to sit for a portrait, men, women, children. Portrait painting was almost as popular as portrait photography is to-day. There was a demand for that sort of thing. And whenever there is a decided demand, the supply is not long in waiting.

"Demand calls forth development, special preparation and study. It is worth while making an effort. And when many persons are engaged in the same task, competition and a higher standard are the natural result. Then the man with talent, and the ability to manage his affairs, goes more easily to the front.

"If Rembrandt had lived hundred years earlier, there would have been no Rembrandt. But he came at the right time. The people were prosperous, the painters that had preceded Rembrandt had educated the public. His customers knew what they wanted and they wanted good stuff, and were willing to pay for it. Thus a man could expand, improve, go through an evolution. That is the reason why Rembrandt was so successful and produced so many masterpieces.

We may get to something like this in professional photography. At present the taste of the public is still cramped, too tame and indifferent. Of course, a photographer may educate his public and they may follow him a long way, but no one controls his following absolutely. Customers want to be catered to, and not before they themselves want good stuff can you give them good stuff at all occasions.

You could just as well have asked why was David Octavius Hill and Sarony. It amounts to pretty much the same thing. They were not perfect but they represented their period. And that is the best any of us can do. An adequate demand will always be met by an adequate supply, but the demand must be general. It does not apply to individual cases. And the person who is best equipped, who has the talent, knowledge, experience and who understands to take advantage of the existing conditions around, or in other words who best supplies the demand, is the individual about whom you can ask the same question, why was Rembrandt? Mr. President, I wish you good evening."

And I took the arm of my friend from Allendale and walked away.

KITTENS. ZELLA SCOTT.

THE NITROGEN MAZDA LAMPS

By E. J. WALL, F.R.P.S.

THE introduction of the high power Mazda lamps has placed a new tool in the hands of the photographer; they are useful not only for portraiture but for copying and general studio work.

Special fixtures with daylight screens have been placed on the market, but from a theoretical and practical point of view these are a mistake. The most important feature of the new lamps is the extreme richness of their light in green, orange and red rays when compared with the ordinary carbon filament lamp. The daylight screens are made of blue grass which cuts down these very colors so that the light is comparable to daylight. From the point of view of matching colors or for the mere illumination of stores this may be an advantage, but from the photographic point of view it is a real detriment.

For years the tendency has been towards an increasing use of color-sensitive plates, with the natural result of a much better rendering of skin texture and a consequent reduction of retouching. The introduction of fast portrait panchromatic plates has placed yet another power in the hands of the photographer, but which can only be fully utilized if the nitrogen lamps be used.

Everyone knows that to obtain correct color rendering with panchro plates a color, or ray-filter, is required which with daylight increases the exposure about four times. When using the Mazda lamps no filter is required to obtain markedly improved rendering.

One of the great advantages of the lamps is their portability. They can be shifted about and effects can be obtained that are almost impossible with daylight, and absolutely even lighting can be obtained in copying.

SUMMER ON THE MEADOW. S. H. Willard.

The only disadvantages of these lamps are the heat and the glare. The former, however, is actually of no moment in any reasonable size studio, and the glare can be easily reduced by diffusing screens. Naturally such screens reduce slightly the intensity of the light, but if white scrim or muslin be used the reduction is negligible.

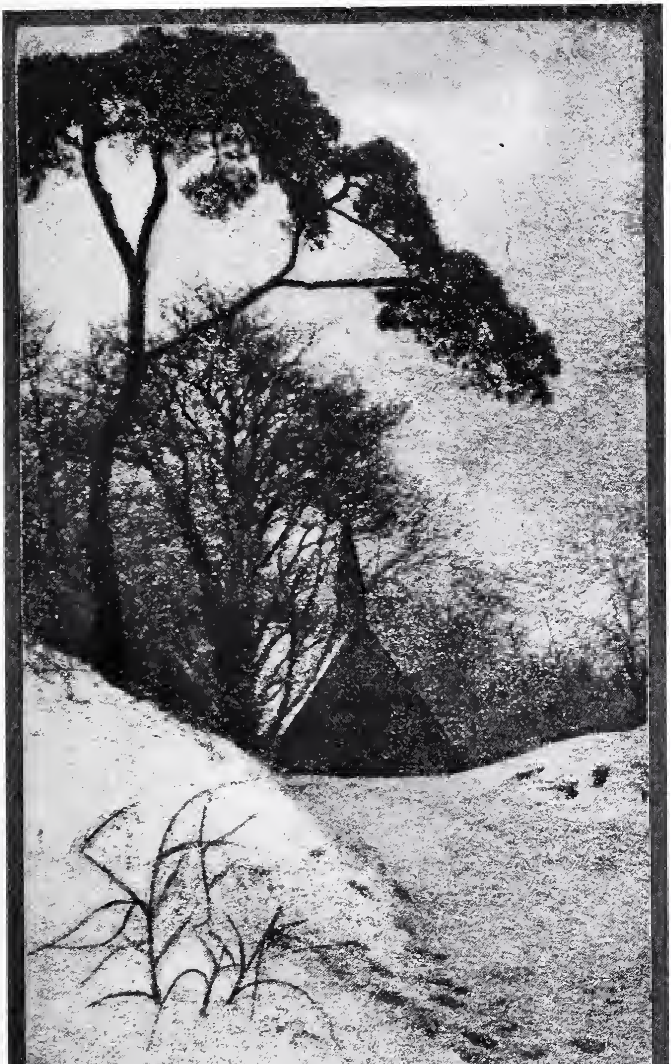
A suitable ray filter for use with these lamps for panchro plates is a weak yellow one, preferably prepared with filter yellow (Hoechst Dye Works) and containing 0.5 grammes per square metre, which is approximately one-twelfth of a grain for a 3 x 3 inch plate. It is possible to stain the diffusing screen in front of the lamp, but for all-round work the filter in front of the lens is to be preferred, especially if the copying of pictures is to be done when a much deeper colored filter is required. The quantity of dye must then be increased six times for the same area. This is practically what is known as a correct luminosity filter and with daylight increases the exposure about four times, but with these lamps the increase is only twice, a natural corollary of the richness in the less refrangible rays.

The smaller sizes of these lamps, such as the 250 cp., will be useful for enlarging, but some means must be taken to lead off the heat. I have always used a 40 watt lamp in a silvered parabolic reflector and replaced this by a 250 cp. nitrogen lamp. My first attempt was with a 4 x 5 negative and in less than five minutes the centre of the negative was badly scorched and the glass cracked.

Hitherto for photomicrography I have always used a hand-fed arc, which has the happy knack of going out in the middle of a long exposure, if not carefully watched. The replacement of the arc by one of the small Mazdas was not a success as the increase of exposure was so great and the extended size of the light and its consequent troubles has prevented so far its permanent adoption. Increase of exposure is a very serious matter when using oil-immersion objectives and color-screens as half-an-hour's exposure is not unusual with the arc.

I believe that the studio of the future will employ Mazda lamps and panchro plates entirely. The photographer will become quite independent of daylight, and will, therefore, be able to locate just where he likes and not be relegated to the top floor of a high building. It may be that at first some little trouble will be met with generally in adjusting oneself to the new conditions, but after all the only thing to learn is how to use panchro plates. These are as easy to work as ordinary plates, if it is once recognized that a green light must be used and it must be a deep green too. The chief trouble with the average operator is that he wants to see the image on the plate so that he can stop development just when he thinks the negative is right. If everyone would recognize that looking at a plate has absolutely no effect on it and that all that the dark-room operator wants to know is just the right kind of negative that will give just that kind of print that is required, then by merely adhering to one fixed developer and temperature, and time of development, the negatives will be always alike.

There is more rubbish written about development and control than on any other subject. The exposure has fixed once for all the ratio of the densities of your negative and all that the most expert operator can do is to arrange the time of development so that the negative is suitable for the particular printing process employed.



WINTER LANDSCAPE. MARTIN VOS.

AN EXPERIMENT TO ILLUSTRATE DEPTH OF FOCUS

By F. M. STEADMAN

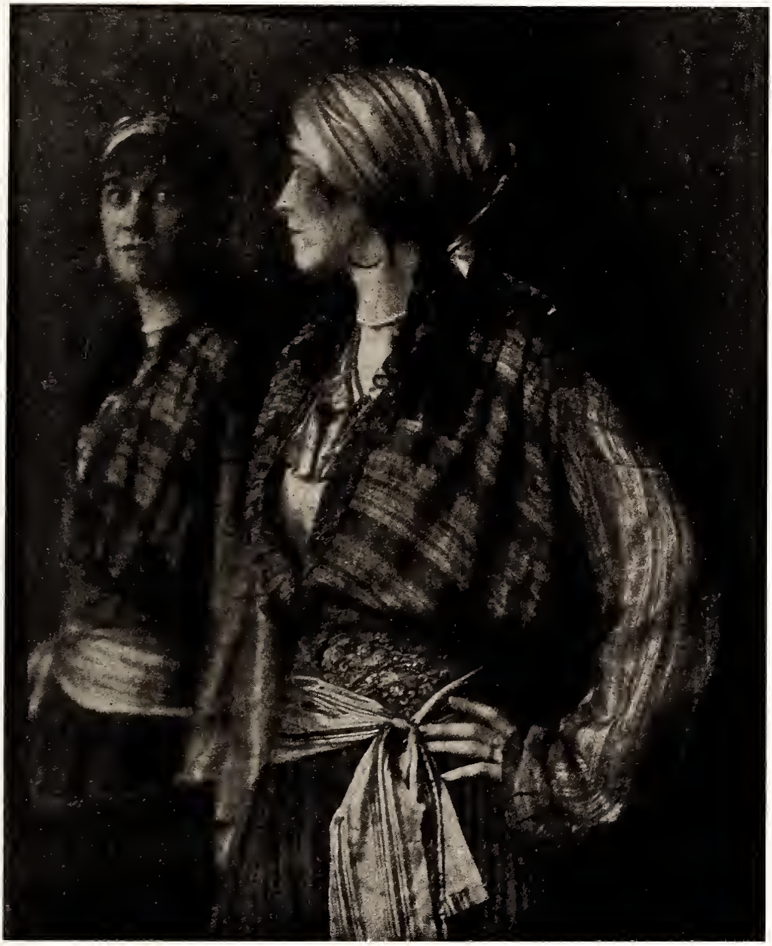
IN spite of the assertions of lens makers to the contrary there are some who still believe that "depth" of focus is a property of lens construction and that consequently one maker's lenses, or one type of construction of lens, could show a greater degree of depth than those of some other maker or type.

I have never seen the matter of depth illustrated as I shall endeavor to illustrate it in this article and I hope that the reader, if he does not already perfectly comprehend the phenomena, will be able to get from these drawings a true mental picture of the phenomenon.

Point a camera (one with a double lens is preferable) at the side of a house from about eight to ten feet distance, and half way from the camera to the house drive a stick in the ground and nail a cardboard to it so that it will face the camera and then focus on the card. Now, punch a rather small hole in the cardboard with the point of a lead pencil, and also remove the lens glasses.

Look through the lens mount or shutter with the stop fully open with the eye at the top of the opening, and have an assistant slide down some flat and brightly colored object or card against the house until its edge just appears in view through the small hole in the card. The assistant should mark on the house the position of the lower edge of the card or object. Repeat the experiment with the eye at the lower edge of the lens opening, and the different points on the wall at which the edge of the card becomes visible will be found as far apart as the diameter of the lens opening.

It might be less trouble to find this spot on the house by driving a pin in the top of the stick, removing the cardboard entirely, and then taking a twine that will reach from the camera to the house and locate the straight lines which before



THE MAKE-UP. **Louis Fleckenstein.**

were sighted as follows: hold one end of the string at the top edge of the lens opening—pass it through and hold it back of the camera—and have the assistant stretch it to the house and move it so that it just touches the head of the pin, marking the point where it touches the wall. Repeat with the string held at the bottom of the lens opening and mark again. Repeating also with the string at the left, and at the right side of the opening will give on the wall the four points of a circle which should be the same size as the stop opening, if the string has been held always at the same tension.

Repeating this experiment with a smaller stop will reduce to the same degree the area on the house. Now, take the camera half way to the stick and perform the same experiment and note how much larger the area on the house becomes with the different openings.

The first illustration shows that each point on the ground-glass is focused upon sharply by the rays of light which come from the individual points on the cardboard. This being true it is also true that all the rays which pass through any point in the same plane as in the plane of the hole punched in the card, which was looked through in the first method given, also come to a focus at individual points on the plate. Now, in the case of the little hole in the card a bit of the card—which if there would have been focused sharply on the ground-glass—has been removed and the exact rays which pass at the individual points within the hole must be those which come to it from some surface, or surfaces, beyond it and opposite the stop opening.

When the object that is focused on is nearer the lens the diameter of the circle on the distant surface, which circle furnishes the rays which come to points on the image-plane, becomes larger. This agrees with our practice as we know that the closer the focused object is to the lens the more out of focus the distance is with any certain stop. But under all conditions this distant circle is reduced by a reduction of the stop. Thus it is that a smaller stop gives more depth of focus than a larger one.

Furthermore, this is seen to be a law of space which works *not in a lens*—only so far as the actual diameter of the stops belongs to the lens—but in *outer nature in front of the lens.*

The two edges of the stop, and a single point in the plane focused upon, form a triangle (A Figure 1) and this same triangle turned about with its base extending the other way (B)—the point being as before at the plane focused upon—will indicate on arriving at the distant surface, the diameter of the circle (C) whose light is focused at one point on the image-plane.

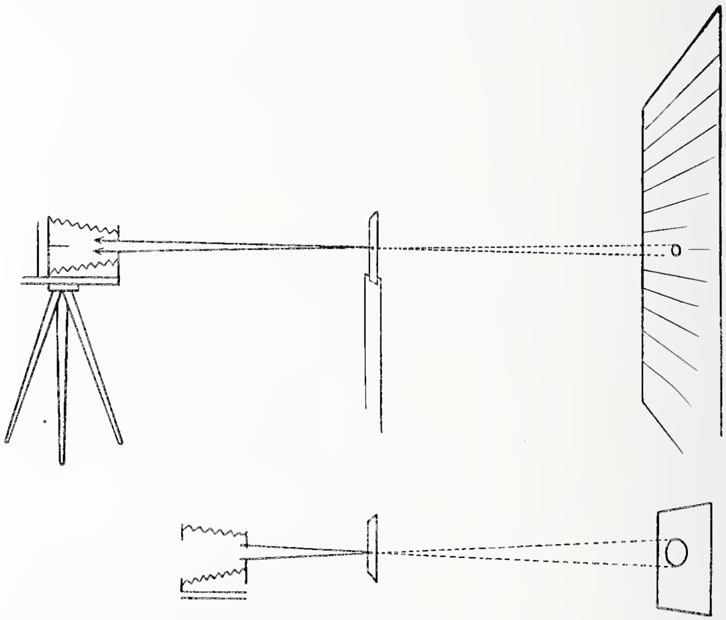


Figure 1.

Now, it is clear that the smaller this circle is the better the individual characteristics of the surface will be rendered in the image, or the "sharper" its image will be.

Since it is the *actual* diameter of the stop then which determines depth it is clear that short focus lenses—say one whose maximum opening is a half inch and which is two inches in focus—will have the same depth and much greater speed than a longer focus lens stopped down to the same diameter opening. In fact, it would have sixteen times the speed of an eight inch focus lens stopped down to a half inch diameter opening so as to secure the same depth.

A negative taken with the small camera at full opening and enlarged four diameters would give the same sized picture as the one taken with the longer focus lens, and it could be taken with one-sixteenth the exposure. This explains the growing popularity of the small camera among people who are after record photographs, or who practice any branch of the work which does not call for an out-of-focus effect in certain planes as compared to others—the principle laid down in Robinson's "Naturalistic Photography" for artistic workers.

In pin-hole photography the problem is much simpler, the triangle being established by one point on the plate and the two edges of the pin-hole opening. This triangle followed out to the different planes in the subject will give the actual diameter of the circle whose light converges upon the exact points of the plate. Hence, it is that a pin-hole photograph increases in sharpness as the distance from the plate to the hole is increased; the triangle is made more acute, and the circle on a surface a fixed distance away from the camera is decreased. This increased sharpness is also seemingly aided by the increase in the *actual size* of the image of any object when the plate and the pin-hole are more separated.

To see that this is true one need only to suppose an exaggerated case, that of taking a pin-hole picture with the place say two to four diameters of the pin-hole distant from it. The image grows toward the infinitely small on approaching the hole while the triangle as described would allow to converge at each point on the plate light from great areas, to such an extent that nothing of the characteristic appearance of individual surfaces could be differentiated.

In the case of a lens focused upon a near object, and with a wall beyond, as in the figure, it would be easy to observe the truths which have been mentioned, by taking a little trouble to arrange at the back of the camera the following: Procure a strip of ground-glass and of other glass, or two strips of the former if more convenient, long enough to go clear across the camera back, taking out the camera ground-glass entirely. Paste a piece of black on one side of one of the strips so that it projects over the edge about an inch and about a half inch from the edge of the glass prick a pin-hole in the paper. The strip left clean should be ground-glass. In the experiment these strips are to be held, one in each hand, against the back of the camera.

Now, with the lens again in its place lay on the back of the camera, with the ground side out, the clean strip, and focus the card upon it so that the image of the hole will be about a quarter of an inch from the edge of the glass. Then carefully place the strip with the paper on it so that the pin-hole in the paper rests directly over the image of the hole in the card as focused. The camera should be close enough to the card to make the image of the hole a little larger than the pin-hole in the black paper. Now, if the assistant will place against the side of the house a cloth of some decided color, and the first glass be carefully slipped away the eye will see through the pin-hole the pure color of the cloth throughout the whole area of the lens opening, provided the colored surface fills the complete area of the circle on the house as located with the string through the stop. If the colored card be slid over the area from the top down it will appear to rise in the stop until it is full of the color.

Now, have the assistant slip the corner of any colored card over the hole in the cardboard, and in contact with it, and it will be seen on looking through the pin-hole that the whole color of the lens opening will change instantaneously, or nearly so, when the card reaches the point over the hole. This simply proves again the same truth, and in fact the fundamental truth, of image formation, i. e., that from each point on a plane which is focused upon light goes out to the whole lens area and is turned again to individual points on the plate. This is what forms images and makes photography with lenses possible.

It will be interesting to observe the appearance of the lens opening through the pin-hole, when a card or paper having imprinted upon it a picture in colors, as a calendar picture, or any such varicolored surface, is moved at random across the face of the cardboard which has been focused upon. It is curious to note that the lens opening throughout is always illuminated with a like color which seems to change instantly as the card is moved about, in fact, if the transition of the color is not instantaneous it is proof that the image was not sharply focused, or that the pin-hole was too large. Of

HOME PORTRAIT. F. M. STEADMAN.

course, any size in the pin-hole takes away the theoretical perfection of this instantaneous change of color. Yet the experiment is very interesting. At the same time if the camera be turned, or the ground-glass moved to bring the pin-hole in the black paper against the out of focus image of the house, and a small brightly colored object be moved about against the house, within the circle which has been described in this experiment, it will be seen through the pin-hole not to fill all of the lens opening. When it is moved downward it will seem to rise in the lens and the reverse. This is because the crossing of the rays takes place at that plane which is focused upon, and is a simple phase of the law that light travels through a like medium in a straight line.

IN THE LAND OF SOLITUDE. E. D. LEPPERT.

EVENING O'ER PORTLAND HARBOR. F. W. HILL.

STEREOSCOPY WITHOUT SPECIAL APPARATUS

By JOHN EDWARD ADNAMS

STEREOSCOPIC work does not receive as much attention from amateur photographers as it deserves.

Some of them seem to be ignorant of the unique charm of a stereoscopic representation and the effect of solidity and realism which it gives.

Others while realizing this have an idea that to produce a stereogram requires a special form of camera and entails a great deal of extra trouble and complication in the printing and mounting. This is not the case, as there is no more trouble involved than in ordinary photography, and the results obtained are quite worth the trial.

An ordinary photograph represents a scene as it would appear to us if we used only one eye and closed the other, whereas a stereogram represents it as it appears to us when we use both eyes.

If you show anyone a good slide in the stereoscope the remark almost invariably is, "How well it stands out and how true to nature it looks!"

The beauty of a scene when we look at it very often depends entirely on the stereoscopic effect, and that is a very common reason for the disappointment we so often feel when we have photographed some scene that has appealed to us strongly, and find it fails to reproduce the beauty we saw in it.

Stereoscopic work can easily be done with an ordinary camera, by making two exposures, shifting the camera about three inches to right or left between the exposures.

This, of course, precludes taking any subject in motion, but there are a thousand and one good subjects to be taken in which there is no motion to contend with. The camera may be rested on a table, a wall, or the top of a gate, anything convenient. It may even be held in the hand and the position

JAMES W. DOOLITTLE.

of the whole body shifted a few inches. This accounts for *accidental* stereograms of which I have secured a good many quite unintentionally.

The first of these accidental cases I had was at Newcastle on Tyne and I only discovered it to be a stereogram about a year afterwards.

In the centre of the busy portion of Newcastle stands St. John's Church surrounded by a graveyard laid out as a garden, a veritable oasis of peaceful beauty in the midst of the bustle. I took a snapshot through the closed gate, and then fearing that I had accidentally included one of the iron bars of the gate I made a fresh exposure a few inches to the right of the first one. The result was a good stereogram—(Figure 1).

On another occasion I had taken a snapshot of a curious and interesting wayside chapel at Falaen in Belgium, when a misgiving came into my mind that some mistake had been made in the exposure. I returned and made a fresh one. This pair of exposures also turned out a good stereogram. In one print some poultry appears in the roadway, but not in the other which was taken afterwards, but this is no detriment when viewed in the stereoscope (Figure 2).

It is advisable for a beginner to make some mark of identification on one of the negatives so as to be sure when mounting the prints to get the right hand view mounted on the right-hand side and the other on the left. If this is not done there will be a curious distortion which is called "pseudoscopy" in which nearer objects appear farther off than dis-
first one. The result was a good stereogram—(Figure 1).

Another very good way of obtaining stereoscopic pictures without buying a stereoscopic camera is to adopt pinhole photography. Any handy man can make himself a pinhole stereoscopic camera at the cost of a few cents, and the results are very satisfactory. The pleasing softness of pinhole work suits the stereoscope very well, and it does away with any trouble caused by any possible passersby crossing the field of view, because the pinhole does not record any moving objects.

A street scene which if taken in the way I have described by two exposures might have a different set of figures in the right hand picture to those in the left, but the pinhole camera would simply leave the figures out and give an empty street.

OLD DINAN. W. H. WOMERSLEY.

The pinhole stereoscopic camera is merely a light tight box with a thin partition down the middle of a suitable size to take two quarter plates side by side at one end and a pair of pinholes at the other end, each facing the centre of one of the plates; the width of a quarter plate thus regulates the distance of the pinholes from one another at a little over 3 or 3¼ inches.

For those unfamiliar with pinhole work I may explain that a pinhole is really a fine hole made by a *needle* (not a pin) in a thin sheet of brass, copper, vulcanite or even cardboard.

Figure 1.
ST. JOHN'S, NEWCASTLE-ON-TYNE.

Want of space prevents a more detailed description of the making of the pinhole and camera, but instructions may be found in any handbook on "pinhole or stenopaic photography."

A word as to the subjects to select. It is very little use to take open landscape or distant views stereoscopically. Foreground subjects are best as a rule, especially those in which some object stands out strikingly from its background, or two or three different planes stand out in relief from one another. A vista or peep in the woodlands or a house with leafless trees in front of it will often make a charming stereo-

THE LONELY MOOR. George Steele Seymour.

gram, but if taken in the ordinary way would be quite a failure.

The old fashioned stereoscope so popular and fashionable fifty years ago was in the form of an enclosed box, and limited the size of the slides, but stereoscopes are now made open and the slides may have the prints the full height of a quarter plate which gives a larger picture.

The "rule of thumb" practice of stereoscopy here described is to be recommended to amateurs because they can practice it with the camera they are using; but it is quite possible that the results may please them so much as to induce them to go in for that branch of work seriously with a real stereoscopic camera.

Figure 2.
WAYSIDE CHAPEL, FALAEN, BELGIUM.

WHERE DRAPERY PLAYS ITS PART

By GEORGE D. JOPSON

HOW many Photographers give the question of drapery serious consideration? I have met several who never drape a subject and yet they have been in the photographic business for a number of years, turning out good clean work. I have also heard a few of these men complain of a "new comer," who has proven to be no better workman than themselves, taking away their trade. Upon a visit to the "new comer" I find him a hustling up-to-date business man who is straining to keep abreast with this strenuous progressive age. In his "up-to-dateness" I find he is prepared for all emergencies, a part of which is necessary material for draperies.

Now, Mr. Photographer, how often do you have some lady who has accompanied a friend to your studio remark, "If I only had on another dress I would have my picture taken to-day?" While this prospective customer is in the humor—or we might say has an acute attack of "photographic fever," and we not having the necessary remedy at hand it is ninety-nine chances out of a hundred if we ever see her again.

The wise up-to-date photographer will be prepared to deal with such a prospective customer by having on hand a sure cure for the malady. It certainly is unwise to allow a person who makes such a remark to leave the studio without making a few negatives. Here is a convincing argument and one that will appeal to the average thinking lady: The waist, or dress, no matter how beautiful to-day will in a year or two be out of fashion, and in five years or less become quite ancient. A drapery is always up to the minute for it possesses no set rules of fashion. Therefore it is, always has been and always will be acceptable in the best of society.

I have saved many a customer and made new ones with arguments along such a line. The photographer should have

Figure 1.

a piece of sateen about five yards long. Also some chiffon and maline.

Figure 1 shows a very simple manner in which to use a drapery. First, find centre of goods, place over breast and carry to back under the arms, where it is to be "cris-crossed" as shown in Figure 2; then carried over the shoulders. No pins used, only a piece of tape tied around waist holds the drapery in place. To produce a V shape in front simply reverse the operation. This is an easy form of drapery to practice with. As one becomes more proficient the intricate draperies will suggest themselves.

Figure 2.

Figure No. 3 is the same drapery as Figure 1—not disturbed in any manner outside of model being turned and arranged for a line light effect. In Figure 2 the hair was "done up" and a piece of chiffon pinned on the shoulder with the breastpin shown in Figure 1. This pin and the string of beads are a part of my accessories, and same can be bought in any ten cent store.

To a successful business photographer, or to a successful artistic photographer, the study of draperies has been found of much benefit. For to be successful from either a business or artistic standpoint one must possess a great imagination;

Figure 3.

must see things in the future; must think a result out in the mind. Before one can translate his ideas into realities he must develop them in his soul. He must dream dreams and see visions. The cultivation of taste in draperies enlarges the above mentioned instincts with the result that the mind more easily grasps the complicated art problems with the gratifying result of forcing one to recognition in the photographic world.

AUTOCHROMY UP TO DATE

By E. A. BIERMAN

THE present moment seems hardly propitious for writing about the delightful art of color photography, more especially about the autochrome process, while the country of its birth is immersed in the greatest war of all time, and the plates can only be obtained with difficulty and in much reduced quantities; but we all trust that this state of things is nearing its conclusion and that soon we shall be able to pursue our favorite hobby unimpeded. I hope that some of my brother photographers may be induced to give my methods careful consideration, and then I feel sure that many of the difficulties and uncertainties of the process will be found to have vanished.

I first took up the process in the year of its introduction, viz., 1907, and the first difficulty that faced me in common with all other workers was that of exposure. The makers give as a guide 1 second at F/8 in best summer light and commencing as I did at Christmas time, and making due allowance for the weaker light, I found that I had to give a very considerable increase of exposure over and above this to obtain a satisfactory result. Then again, I found that if smaller diaphragms were used the usual method of calculating the increase of exposure also ended in failure, and a still further increase of exposure was indicated.

After a considerable amount of experimenting I found that the usual multiple of 2 was altered to 2½. This gave an exposure scale which became correct both for the reduced actinic value of the light and for smaller diaphragms, so that if a plate would be correctly exposed at 1 second when using F/8, it would require 6¼ seconds at F/16 instead of 4 seconds as in ordinary practice. Or again, if a plate would be correctly exposed at 1 second in good light it would require

CENTURY PLANT. FEDORA E. D. BROWN.

$6\frac{1}{4}$ seconds with the same diaphragm when the light has only one fourth of the actinic value.

I always use an actinometer to test the value of the light and my exposure scale reads as follows:—

	1	$2\frac{1}{2}$	$6\frac{1}{4}$	$15\frac{1}{2}$	39	$97\frac{1}{2}$
instead of	1	2	4	8	16	32

as in ordinary practice. Of course, fractions of seconds do not count at all, and a generous exposure should always be given. These exposures must be doubled for near subjects and halved for distant ones.

Then came the question of development. Here the makers issue a liquid developer named Quinomet and recommend a strength of 1 part to 4 of water, with a developing time of $2\frac{1}{2}$ minutes at 60 to 65 Fahrenheit. This I found worked out quite well occasionally, but there were many instances where it did not, such as for example, a view taken in bright sunlight, when I found that most of the color in the sunshine would be bleached out by over-development of the negative image. To overcome this I devised a modified factorial method of development as follows: I vary the strength of the developer to suit the subject, diluting the Quinomet as much as 1 to 10 of water for the brighter lighting, my average being 1 to 6. The various dilutions may be tabulated thus:—

1- 4 for under-exposed or dull light.
1- 6 " average diffused light.
1- 8 " diffused sunlight without heavy contrasts.
1-10 " bright sunlight and strong contrasts.

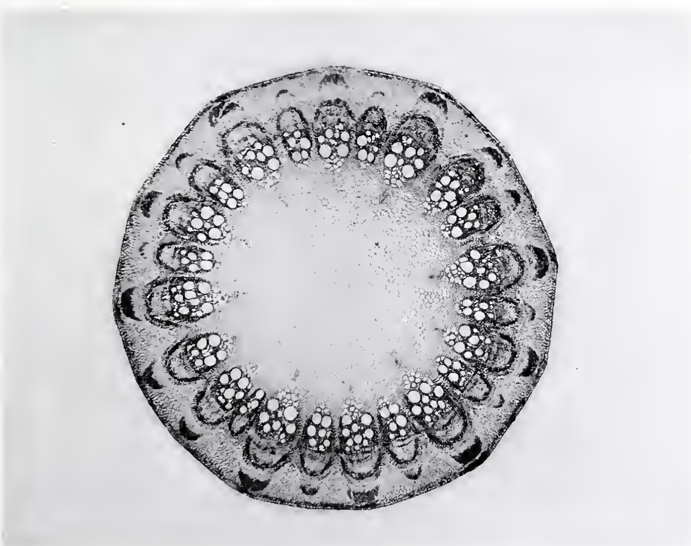
For developing I use a green safe light made with M. M. Lumiére's virida papers which gives plenty of light to enable the time to be read on a watch when held close to the lamp. After mixing my developer to the required dilution to suit the subject I place the plate in a dish holding it above the level of the light, and pour on the developer, immediately commencing to count seconds. Lower the dish until it has the full light of the lamp upon it and note the time of the first appearance of the image, ignoring sky. This time of appearance is then squared and multiplied by 4. This rule holds good for all dilutions, therefore if the image appears in 5 seconds 5x5x4 = 100 seconds total time of development, or in 7 seconds 7x7x4 = 196 seconds. The usual time of appearance is from 5 to 8 seconds, if longer than this under exposure is a certainty and the developer should be strengthened up to 1 to 4 and the dish covered and rocked for 8 minutes, after which there is nothing to gain.

By using this method of development it will be found that the light colors do not become over-developed and the limit of detail in the shadows is also obtained, the chief factor of success being that the plate should have had sufficient exposure as there is a fair amount of latitude upwards but very little downwards.

For the reversing bath I recommend the following:

Potash Bichromate	20 grs.
Acid Sulphuric	40 minims
Water	10 ozs.

This can be used over and over again and will keep good for months, and also it has the very important advantage that the operation can be watched, whereas when using Acid Potash Permanganate it is very difficult to do so and failures often occur from this cause alone.



SECTION OF CLEMATIS STEM. WALTER BAGSHAW, F.R.M.S.

THE HOME MANUFACTURE OF DRY PLATES

By G. T. HARRIS

ONLY the direct assurance of the Editor of this Annual that the topic would be of interest to his readers warranted me in dealing with a subject that is now "taboo" with all photographic editors. "It is of no use to our readers," they say, with an anxious eye on their advertisement columns. Inquiring correspondents are told that there is no recent information on the subject, and that recent improved methods "naturally jealously guarded by the manufacturers" make the older methods obsolete.

Years ago photographic papers teemed with articles by well-known experimentalists who freely gave formulæ and results, and that they did not bristle with mathematical formulæ was nothing to their disadvantage; nor was the looseness in stating plate-speeds much behind present-day methods. As the result of accessible information a large number of photographers were their own plate makers, which was not conducted in an amateurish, hole-and-corner manner, as is usually believed to-day. Two firms with which I worked had extremely efficient and commodious departments for the production of the plates used by them, and the saving annually effected ran into a considerable sum of money. In one of these establishments we regularly made and used plates measuring 18″ x 24″, and the daily consumption of plates of various sizes averaged half a gross. One day's work I well remember used up a gross of 10″ x 12″ plates, which at $45.00 a gross, the then current commercial price, represented quite a sum of money.

It was a frequent practice then for firms with a large plate consumption to produce for themselves, and the experience gained in their own private practice was usually published without stint for the benefit of others. One cannot look back upon those days without being appalled at the awful stupidity of men who prodigally gave to the world information with

EVENING AT AXMOUTH, SOUTH DEVON. G. T. Harris.

which they could have made a snug "ring" for themselves. It is a pretty open secret that the man who can go with a Brobdinagian C-W-O order can practically make his own discounts, although no invoice would show it; the ingenuity of some firms in this respect being instructive and commanding admiration. But the moderate consumer is compelled to bow the neck to Trust prices.

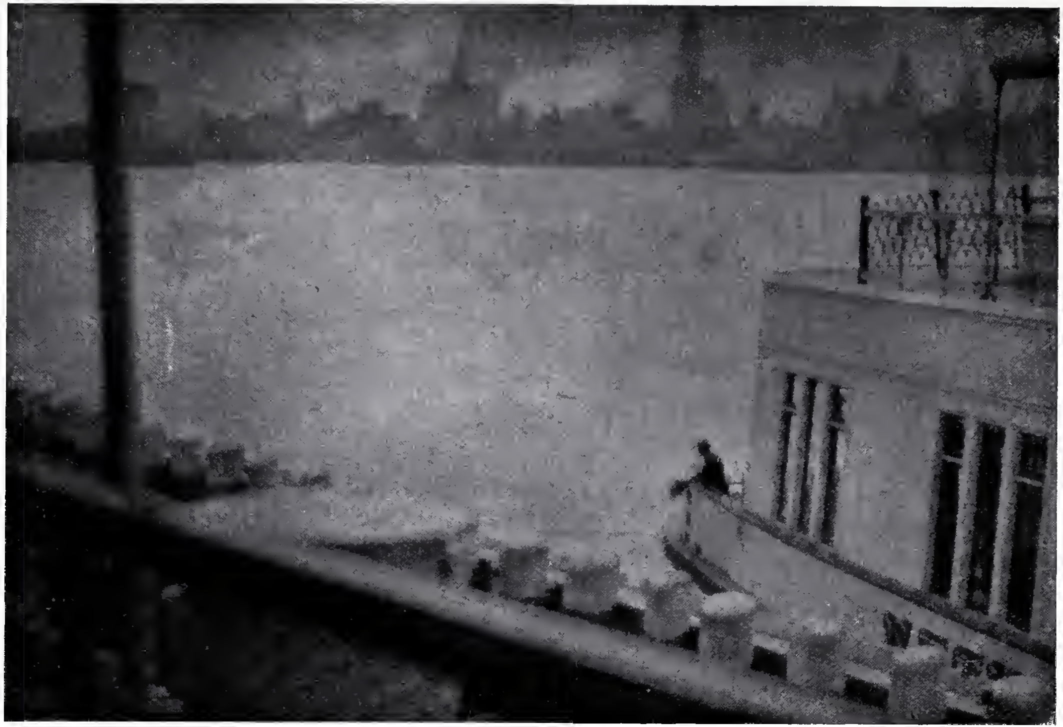
At the present time in England these have joined the Air Service owing to the war; that is to say, the country's necessity is the plate-maker's opportunity. Six years ago I dismantled my emulsion and drying room as the price at which I could get good plates kept the plate bill within reasonable limits. Now, I am re-installing the outfit. It is possible that practical directions for making a good all-round plate of average speed may interest more photographers than would at first sight be expected. I do know that many in England would elect to make at least a part of their annual consumption if they could feel sure of the certainty of success. Of course, the photographer who can command his own price for his work has no need to bother about the cost of his material; if plates and paper are doubled he merely charges the advance to his customers and loses no sleep. Many are less fortunate, if they alter their prices their customers decide that they can do without the work, the public simply hates fluctuation in prices; whether it is foodstuff or photographs. The former has no need to consider private production of plates, the latter may find it to his great advantage from a business point of view.

It may be stated at the outset, emphatically, that to the photographer with ordinary ability there is no difficulty whatever in producing a good, clean plate of very fair rapidity, and with a small expenditure of time and trouble once matters are going smoothly. By "fair rapidity" I would indicate a speed of 200 H & D, and I believe that a plate of such speed (or even less) will carry the average photographer through three-fourths of his work. Commercial plates of 400 H & D and 500 H & D can always be looked upon with suspicion from a speed point of view, in practice they may not work out much faster than one of 250 H & D. Photographers generally have quite lost their heads over plate-speeds, being aided in doing so by plate-makers. Very rapid plates undoubtedly have their uses, but the ordinary commercial photographer's average work can be done with a plate of moderate speed, especially now that modern lenses have made large apertures available.

An extensive knowledge of chemistry is also assumed to be necessary before plate-making operations can be undertaken. This is another fallacy. It must be pointed out that the photographer who essays to make plates of moderate speed for his own use is in a very different position from the trade plate-maker who is constantly trying to break his rivals' records by some few degrees H. & D., however extracted. Most photographers have, or should have, a rudimentary acquaintance with at least inorganic chemistry, and if they are naturally clean and methodical workers their laboratory equipment may be considered sufficient.

If plate-making on any scale is contemplated it is certainly desirable to fit up a drying room, however small. There is no doubt but what plates dry much better and more evenly in a room of even small dimensions, than in the most ingeniously constructed drying box. If small sized plates only are to be made then a large drying box may be used, but if plates up to 12 x 15 are made, by all means let the drying chamber be a small room fitted up. To describe in detail the fitting up of such a room would extend this paper to a prohibitive length, so I can only give terse directions for essentials, leaving it to the intelligence of the individual to work out the details.

The prime consideration is an arrangement for carrying off the damp air and supplying dry, and probably the most simple and effective are one or more air shafts opening into the outer air with electrically propelled fans for causing circulation. These air shafts must, of course, be light tight, and should not be too small. For heating the room hot water pipes, with the gas stove and reservoir outside the drying room, is a very efficient and convenient method. The pipes should run completely round the room so that even heating may be assured. Quick drying is not to be sought for so much as even and steady drying in a moderate time. If a batch of plates is completely dry in twelve hours the conditions will be working satisfactorily. Once the plates are coated and placed in the

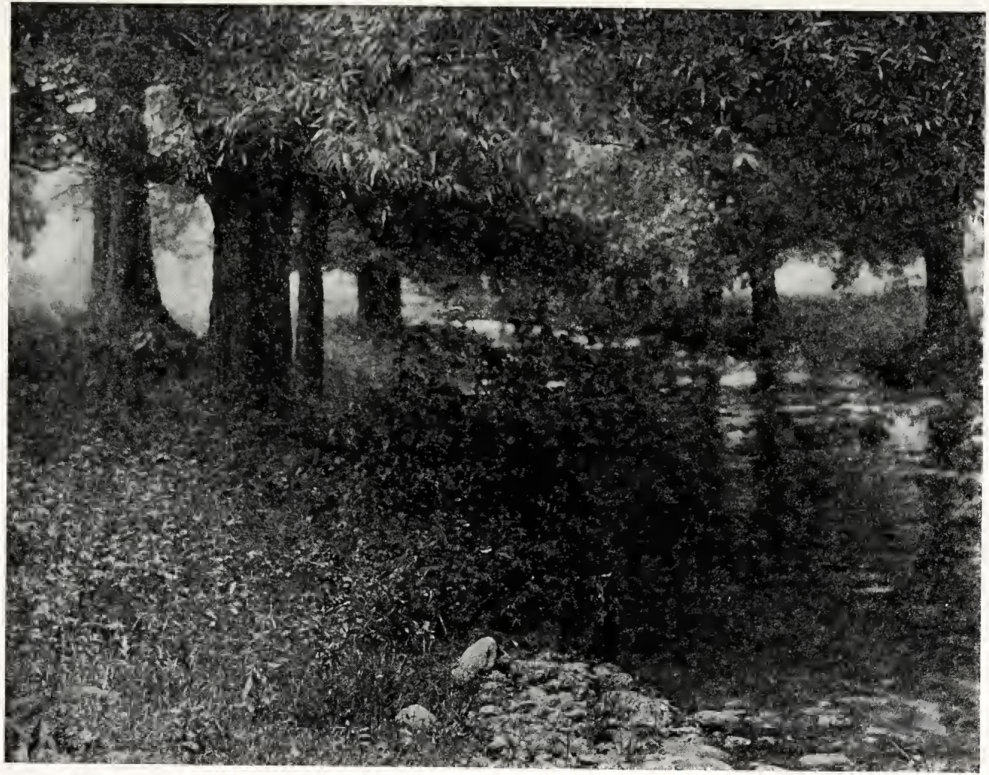


LOWER NEW YORK. BLANCHE C. HUNGERFORD.

drying racks the room should be shut up and left until the plates are completely dry, as going in and out of the room during drying operations may cause uneven drying, when the plates will show drying marks on development. The temperature of the drying room should be maintained at from 65° F. to 70° F. The plates should be placed in open, grooved racks, capable of accommodating about a dozen plates, separated at least two inches, and these racks placed when full on open rack-work shelves running around the top of the room. A moderate sized drying room will, with this arrangement, secure the complete drying of about two gross of 6½ x 9½ plates within twelve hours. These when halved give four gross of half plates, so such a batch should satisfy the moderate user.

To come to the emulsion itself. I propose to give two formulæ, which I believe will cover all average requirements, and as I have used them myself for years and have made thousands of plates from them I, naturally, have considerable confidence in them. They are not published formulæ, but the result of gradual improvement through a long course of work, until a good all-round standard of speed and quality was reached. At the same time I would warn the beginner against any hope of getting "speed" simply from formulæ. It is as much due to method and experience as to formula, and the experienced emulsionist will get a speed of 200 H & D from a formula that the beginner will extract only about 50 H & D from. The apprenticeship I served to reach 200 or 250 H & D was long and painstaking, and success was certainly not due to books. Let me caution the budding platemaker against the quest for "speed"; leave that to the platemakers of the commercial brand. Aim at a good sound emulsion of moderate speed, and you will be astonished how far such a plate will carry you—especially when it is of your own manufacture and you are getting it at rock bottom prices.

It goes without saying that I cannot here enter into the fundamental details of emulsion work from want of space, and the beginner is advised to make himself acquainted with them from some manual of Photography. Sir W. Abney's "Instruction in Photography" contains sound and concise instructions for gelatine emulsion procedure, but if available



THE STREAM. Rupert Bridge.

Dr. Eder's classic Handbook contains a mine of information on all phases of emulsion work.

The first formula given is one whereby a plate of great clearness and giving any amount of opacity may be made; an emulsion, in fact, eminently suited for photo-mechanical processes. The plates may be used for general work where a slow plate is indicated, but they give density so readily that they are less suited for ordinary use than for a special purpose like making negatives of black and white drawings.

A.	Potassium bromide	43 grammes
	Barium iodide	2 grammes
	Gelatine	8 grammes
	Distilled water	340 c.c.
B.	Silver nitrate	52 grammes
	Distilled water	340 c.c.
C.	Gelatine (hard)	65 grammes

The A solution may be already sufficiently acid to slowly redden litmus paper, if not it should be carefully acidified with a 10% solution of hydrochloric acid. A very light acidity is all that is necessary. The bromised gelatine (A) is emulsified by adding B to it, both solutions being at a temperature of about 70° C. Fineness of grain is dependent on careful mixing, and every care should be taken to secure it. When emulsification is complete the emulsion should be so fine in grain as to be scarcely perceptible when a thin film is examined with a magnifier by transmitted light, and the color will be a rich ruby. Rapidity now will depend on the length of time the emulsion is cooked, and as the above formula is specially intended for a slow, clear emulsion, it is better to limit the cooking to thirty or forty minutes boiling, with frequent stirring. When sufficient cooking has been given the emulsion is cooled down and the bulk of the gelatine (C), also melted, is added to the emulsion. The emulsion is now laid aside to thoroughly set, which operation may be hastened by resorting to a refrigerator.

Shredding and washing the set emulsion causes some trouble to the beginner, but as a successful issue depends to a considerable extent upon the thorough washing of the emulsion pains must be taken to ensure this being attained. Various mechanical devices for shredding the firmly set emulsion might be described, and though some such device is a great convenience when constant emulsion work is being done it is not indispensable, and as no such piece of apparatus can be procured through the dealers it will be best for the beginner to rely on a simple method until he is sufficiently familiar with emulsion work to devise a small shredding press to suit his requirements. I may say, however, that the most convenient I ever used was a small hydraulic cylinder, of suitable dimensions, into which the finished emulsion was poured and left to thoroughly set. When the time came for shredding the set emulsion a cap of silver wire (gauze) was screwed into place on one end of the cylinder; the other end was connected with the main water supply and the emulsion forced through the gauze by the piston into the washing tank. However, a large amount of emulsion work can be accomplished with the time-honored canvas shredder.

The meshes should not be too close, or the emulsion when squeezed will absorb too much water while washing and become that *bète noir,* a "sloppy" emulsion. The strands should be at least an eighth of an inch apart, and the size of the piece of canvas generous; nothing is more trying than attempting to squeeze a hard ball of emulsion through canvas too small to contain it. As to the washing tank, this, like the shredder, can be of a simple model. A water-tight and light-tight wooden box, well varnished with shellac varnish, having a top flush with the bottom so as completely to empty it, and a canvas covered frame supported about the middle of it to take the shredded emulsion is really as efficient as more pretentious tanks. Do not on any account restrict the size of washing tank, as plenty of water is conducive to the thorough elimination of the by-products. My own tank holds about nine gallons of water, and in this I wash sufficient emulsion for about three gross of plates. The objective to be aimed at is the *thorough* washing of a *well-set* emulsion. This carries one a long way towards success. Some commercial emulsions are shockingly washed. It suits me to shred my emulsions in the late afternoon. The water in the tank is then changed twice before leaving for the night; next morning the water is changed several times until midday when it is finally run off and the washed emulsion drained until late

GOING TO BUY THE FOOD. GINO BELOTTI.

afternoon. It is then melted up and, if time permits, filtered.

It is of paramount importance to keep the washing tank and water as cool as possible during washing operations. Once an emulsion becomes "sloppy" the best thing is to flavor it and serve it out to your dinner guests as mayonnaise dressing for it is no earthly good as emulsion. There are various "cures" extant for this particular infliction and I have tried them, but I can only think that my cases were of an especially virulent type. Methodical and careful work, however, prevents the occurrence of this evil, and if by any chance an emulsion should show signs of being somewhat too thin it is better to set it aside, make another having greater consistency than normal, and mix the two batches.

Filtering a large batch of emulsion in a dull ruby light can become a tragedy if things don't go right, so it is worth some little trouble to install a satisfactory system from the first. Here is my own. A stoneware jar to hold the batch is fitted with a large air-proof bung. A good sized glass filter funnel is cemented into the bung, and also an exhaust tube, so that it can be connected with a water pump. The emulsion is filtered through two thicknesses of well-washed swan's-down calico, though a good tuft of washed cotton-wool placed in the neck of the funnel answers as well. The stoneware jar being impervious to light and the glass funnel being painted on the outside with black varnish a good light can be used without feeling nervous about fogging the emulsion.

There is no royal road to successful plate coating, at least I never found one. One of the romances of photography is the collection of hints in the photographic journals of the Emulsion Era on coating plates with emulsion, it is the photographer's Arabian Nights. A suit of overalls and practice will, however, prove the best equipment. If the emulsion has been properly made there is really no difficulty in plate-coating after a little experience. The correct amount for coating the plate can be estimated by the size of the pool poured on, so that none need be returned to the pourer, and when distributed and laid quickly down on a levelled slab it will set perfectly even. The novice would be astonished at the ease and quickness with which a practised coater will get through a couple of gross of 6½ x 9½ plates.

COME AND JOIN US. GILL & SON.

Do not follow the books with regard to the levelling slab; they usually advise a square plate *glass* slab, whereas a long, narrow truly worked *slate* slab is better in every respect. This must be most accurately levelled, and solidly mounted. It is convenient to have it placed at right angles to the coating table, so that the coater has only to turn aside and place the plate down to set. Cowan's coating bench was an excellent arrangement, and can be easily set up if thought desirable. The coating lamp should be placed low, and the operator's eyes shielded from the ruby light. To ensure the best conditions for coating the emulsion should be used at very little above the melting point; it will then flow more steadily over the plate, and also set quicker. Quick setting when once coated is a desideratum, and if an arrangement can be effected whereby the plates when on the levelling table pass either over or under an ice box it is a very great advantage. Up to 10 x 12 plates I use a pneumatic holder; above that size I prefer balancing the plate on the tips of my fingers. For large plates, 18 x 24 or so, the plate may be supported on a child's rubber playing ball of good size placed in the mouth of a jug of suitable height.

Assuming that the beginner has made several batches of slow plates and by so doing has become accustomed to the operations and routine of emulsion work I will describe the preparation of an emulsion for general work, having a speed of about 225 H & D, more or less. The emulsion resulting from the quantities given should measure when washed and re-melted not more than one gallon, and it is safer if ten ounces less. This quantity should coat three gross of plates 6½ x 4¾.

	A.	Nelson's No. 1 gelatine......	200 grains
		Water	16 ounces
added to			
		Silver nitrate	2720 grains
		Water	20 ounces
	B.	Potassium bromide	2200 grains
		Nelson's No. 1 gelatine.......	400 grains
		10% Hydrochloric acid	120 minims
		Water	32 ounces
	C.	Potassium iodide	60 grains
		Nelson's No. 1 gelatine......	50 grains
		Water	4 ounces
emulsified with			
		Silver nitrate	60 grains
		Water	2 ounces
	D.	Hard gelatine	3000 grains
		Water to soak.	

Proceed by emulsifying C at about 70° C. and add it to B before commencing emulsification, bring the two solutions A and B to a temperature of 70° C. and add A to B in the usual manner. I usually reach the blue stage with about forty minutes cooking; then cook at a lower temperature for a further twenty minutes. The color by transmitted light should be almost grey. Add 1½ ounces of a 10% solution of ammonia 880 and *half* the gelatine in D to the emulsion and digest for two to two and a half hours at 20° C. This operation requires care, if the temperature is allowed to rise much above 20° C. fog is liable to be produced. When the time of digestion has expired add the remaining half of gelatine in D and set aside to solidify for washing. When the emulsion is washed and filtered add to it four ounces of absolute alcohol with eight grains of thymol dissolved in it. The emulsion is now set aside for three days' ripening, but there is no reason why it should not be kept several weeks if it is more convenient to do so. I have often kept emulsions for a couple of months. After the emulsion has been filtered and the additions made it is convenient to coat two or three plates for testing, before the batch itself is coated up. The rapidity will be less than when ripened, but a general knowledge of the emulsion is gained. If a slight chemical fog is apparent matters may be improved by adding to the emulsion half an ounce of a 1:100 solution of ammonium bromide. In fact some authorities recommend making this addition in any case, and also chrome alum, but if the emulsion is free from fog and does not show signs of frilling I prefer to avoid any additions.

The emulsion as here described is a plain unorthochromatic one, but should an orthochromatic emulsion be desired one ounce of a one per cent solution of erythrosine is added to the emulsion when the ammonia is added between cooking and digestion. The orthochromatic effect, or to be more accurate the filter sensitiveness, produced by this method is not comparable with bathed plates by the best modern methods, but it is a very useful quality, which may be increased to any requisite extent by subsequent bathing. I find that the orthochromatised emulsion is sufficiently filter sensitive for all average work, and when I want special color sensitiveness I obtain it by subsequent bathing. Another point in its favor is that orthochromatic plates prepared as above keep excellently; bathed plates do not, and some commercial ortho-plates veil with three months' storage.

That esteemed observer of human frailties, Mark Twain, observed that the information the ancients didn't possess was very voluminous, and it may be objected that the information on plate-making that this paper doesn't contain is likewise voluminous. It is. My object has been to put the intending emulsion worker on the right way. The rudiments of the process can be found elsewhere. In fact the pages of the early volumes of this *Annual* contain articles on emulsion work by that ardent experimentatist, W. K. Burton, one of the glorious band of spade-workers who laid the foundation of dry-plate photography. In America there may be no inducement for any photographer to contemplate manufacturing his own plates; the prices obtained for work will be based on the prices paid for material, and the stability of profit assured. In England the volcanic eruption of dynasts has completely upset the photographic world, and the Garden of Eden photographers have lived in so long is closed against any return. Manufacturers, secure from foreign interruption, are becoming historical students and copying the price-lists of thirty-five years ago. Meanwhile the photographer who has built up a business on modern prices finds himself between the devil and the deep sea. On the one hand is the dealer with his thirty-five per cent advance; on the other the obdurate customer who goes without her photographs rather than pay an advance on hitherto existing prices.

I am convinced that if photographers knew how comparatively easy it is to produce a batch of plates of moderate speed, and how easily it fits into the ordinary routine of a photographic business, more would interest themselves in emulsion work with the future prospect before them. Even if they have to buy a gross or so of "500" H & D for ultra rapid work grosses of plates can be used for work in which speed doesn't count, and the comfort of being able to make a second or third exposure without fearing the brokers is very real. It must always be remembered that when a photographer buys a dozen plates it is not so much the emulsion he is paying for as the establishment charges of the manufacturer. The cost of home prepared plates in my hands works out with material at pre-war prices at the following prices per dozen plates:—4¾ x 6½, 17 cents; 6½ x 9½, 34 cents; 10 x 12, 75 cents.

This estimate includes glass and emulsion. Of course all waste negatives are washed off and re-coated, so that the charge for glass is often entirely eliminated. It can be objected that no account is taken of time and establishment charges; the reason for this should be obvious. The reader who does not wish to be convinced and converted may add to my estimate what he chooses for these two items, and so demonstrate to himself that home-made plates are too expensive a luxury for him to handle; the reader who is seriously bent on economy will soon decide whether he has not an odd hour or two now and then that can be utilized in this way without the ordinary routine of the business being affected. Personally I never found any hardship in turning into the coating room after the day's work and coating a gross or more of plates, but one has always to remember that this form of recreation might not appeal to every one.

CHAS. W. DOUTT.

THE AUTOCHROME

Possibilities of its use as a Pictorial Medium

By DAVID J. SHEAHAN

IN last year's *Annual* I pointed out the simplicity of making pictures by the Autochrome process. Still the majority of amateurs unfortunately seem to think that the process is a very tedious and complicated one, whereas this method of photography is the simplest and most pleasing in its results of all. It also is the quickest means of producing the finished picture, for the entire process of manipulation, even to the drying and binding of the plate, seldom takes over thirty minutes.

We have now arrived at a period where it is known that the Autochrome will take care of all colors, and further demonstration in that respect is unnecessary; so why waste time making incongruous things, such as flowers massed together in various hues, without any regard to composition, or harmony of color, also the photographing of persons arrayed in the spectrum, so that all the colors clash?

We may well get back to nature, or at least follow the examples of painters. They do not consider it necessary to use every color in their box in order to produce a picture; so why should we disciples of the camera be guilty of what the masters of the brush avoid. Simplicity should be our keynote. We have long been content with monochromes, and it has been the excellent work in monochrome that has compelled painters to reluctantly acknowledge the camera is a legitimate means of pictorial expression. Therefore, when we have the added advantage of color, why should we go crazy and try to undo that which it has taken us years of uphill work to accomplish. I maintain that our best pictorial workers, by means of the Autochrome plate, can just as far excel our brothers of the brush in the future as they have excelled us in the past.

We do not have to trouble any more about the creating of

MORNING. Karl Struss.

atmosphere. If it is in the landscape, the autochrome will take care of it in a much better and quicker fashion than the painter could hope for. Many of those delicately tinted landscapes which were impossible to reproduce on the ordinary plate can be turned into things of beauty and a joy forever when rendered by the Autochrome.

I appeal to all pictorial workers to give the autochrome a trial and promise them most wonderful results, if properly used. In fact it is very hard for an autochrome worker to go back to the old monochrome method. The latter seems to lack those very essentials which make the autochrome supreme. There is no necessity to resort to artificial means to produce softness in our picture, for the lantern slide when enlarged on the screen will be sufficiently diffused to give a satisfactory pictorial effect. This feature alone ought to appeal to the wiry-sharp school, and may be the means of bringing the contending factions more closely together.

The expense of the autochrome is, of course, a matter to be considered. The expense may be reduced considerably by a little economy in the use of plates. A postcard plate 3¼ x 5½ costs 40 cents, $1.60 for four plates. If we have a septum fitted to the back of the camera, so as to make two exposures on the one plate, which gives us a slide 2¾ x 3¼; or we may take a 5 x 7 plate costing 50 cents and make four exposures on it, which gives us four slides 2½ x 3½. Afterwards these plates may be cut by a sharp glass cutter and bound on an ordinary cover glass, or better still old negatives may be stripped and cut down to cover glass size, 3¼ x 4. When binding on the cover glass square up the plate on the glass and then fasten it thereto allowing the binding strip to cover only a very narrow margin of the plate. By this little dodge we lose nothing, for the mat usually cuts down the lantern slide to these dimensions. Thus we have a saving of forty cents on a box of post-card plates, and a much greater amount on 5 x 7 plates.

It must not be understood, from the preceding paragraph, that it is advisable to cut the plate in two before exposure, as this is a very difficult procedure and is likely to result in injury to the delicate film. It is better to develop the plate before cutting, so it is desirable to have all the exposures on the plate, timed alike, so that they may develop evenly. When the plate is developed, reversed and re-developed and then finally washed and dried, we may proceed with the cutting.

For this purpose we need a sharp knife and a ruler, then carefully cut out a small strip of film, about 1/32 of an inch, at the place where the exposures meet, the plate is then turned over on a sheet of white paper, glass side up, and with a good sharp glass cutter, cut along the white line which appears where the film on the opposite side has been cut away. The glass in the autochrome plate being of a very hard flinty nature it is essential to have a good sharp glass cutter; otherwise the plates will be spoiled by breaking in the wrong place.

The autochrome plate differs essentially from ordinary plates, in first having the glass coated with microscopic starch grains, dyed orange-red, violet, and green. These grains are dusted on without overlapping, and when looked at by transmitted light appear colorless. Over this layer, a very thin panchromatic emulsion is spread, and finally a black card is laid on top of the emulsion. The plate is loaded in the holder, glass side towards the lens, and a special color screen is placed on the lens.

Allowance for the thickness of the plate must be made when focusing, either by reversing the ground glass or else by decreasing the distance between the lens and plate, by the thickness of the plate. This is accomplished by racking the lens nearer the plate.

As the plate is sensitive to all colors, a special light must be used to develop by. This light is made by taking a light tight box, having one side fitted with a clear glass, over which is placed six sheets of virida paper, as supplied by the Lumiere Co. The three yellow papers are placed nearest the light and the green ones on top of the yellow, and finally another sheet of clear glass to keep the papers in place. By using an electric bulb in the box and a switch on the outside, the light can be turned on or off as desired.

One has to be very careful in handling the plate, as the emulsion is extremely thin and very easily scratched. The scratches on being developed produce large green spots, which are the bane of the autochrome worker. Also great care must

SUNLIGHT AND SHADOW. D. EDWARD JONES.

be exercised so as not to allow the fingers in hot weather to touch any part of the plate, either film or glass, as the heat of the hand will ruin the plate.

There are many formulæ for developing autochromes, viz., Pyro, Rodinal, Rytol, &c., but it is best to stick to one, and the Metoquinone formula, as recommended by Lumiere, is as good as any and may be depended on for results. I now use it to the exclusion of all others.

Metoquinone Stock Solution.

Water	30	Oz.
Metoquinone	3½	Drams
Sodium Sulphite	3	Oz.
Ammonia	1	Oz.
Potassium Bromide	1½	Drams

Reversing Solution.

Water	35	Oz.
Potassium Bichromate	30	Grains
Sulphuric Acid	3	Drams

To develop a 5 x 7 plate by methodical development have two graduates ready, and in one mix water 2½ Oz. metoquinone stock sol. 85 min. and in the other ½ Oz. metoquinone stock sol. (for post-card plates take half those quantities). Now working in absolute darkness, remove the black backing paper, and place the plate face up in a tray of suitable size, and pour on the diluted developer in the first graduate; keep rocking the tray, meantime counting seconds, when twenty seconds have elapsed turn on the green light and examine the plate without removing from the tray, keep on counting and as soon as the image commences to appear (pay no attention to clouds or sky) pour on the concentrated developer in the other graduate and develop as by following table,

TABLE FOR METHODICAL DEVELOPMENT

Appearance of Outline of Image (Disregarding Sky) After Immersion	Quantity of Developer to Add on Appearance of First Outlines	Total Duration of Development from Immersion of Plate,	
Seconds		Minutes	Seconds
12 to 14	½ Oz.	1	15
15 to 17	½ Oz.	1	45
18 to 21	½ Oz.	2	15
22 to 27	½ Oz.	3	00
28 to 33	½ Oz.	3	30
34 to 39	½ Oz.	4	30

When the plate is fully developed, rinse it off for about

MOSS BEACH. EDGAR A. COHEN.

fifteen seconds in running water, being careful not to let the fingers touch either the back or front of the plate, next place the plate in the reversing sol., now bring it out into daylight, or more preferable place it eight or ten inches from a fifty watt tungsten lamp, and the plate will reverse in five or six minutes, the exact time of reversal can be judged by looking through the plate.

Next rinse off in running water, for about fifteen seconds, and then place in the original developer, still under the bright light, until the plate blackens over, next give a final washing of about thirty seconds and place away to dry. Be careful not to touch the film during any of these manipulations or green spots will occur.

If a plate is too weak, owing to over-exposure, it can be intensified with the ordinary Bichloride of Mercury intensifier, and then blackened in the original developer, or better still in a weak solution of Sodium Sulphite.

When a plate is under-exposed, and consequently dense, it can be much improved by intensifying as above, and then reducing by Farmers' reducer, the old Ferro-cyanide formulæ. Always intensify before reducing or the results will be disastrous.

While I give this method of trying to save an under-exposure it should only be resorted to when the plate cannot be duplicated, as the results at the best are not very pleasing, owing to the colors being exaggerated and untrue. An under-exposed autochrome is almost hopeless and it is better to destroy it than waste time trying to save it.

I find that I get the best results by exposing the plate so that the image develops up fully in from two and a half to three minutes.

The greatest crux the amateur experiences is in exposure, but by using common sense, backed up by a reliable exposure meter, this difficulty vanishes—the Wynne and Watkins are both good, but must be used judiciously as no meter is absolutely correct, under all conditions, unless backed up by common sense. When thoroughly familiar with the autochrome plate one can dispense with the meter altogether, and judge the exposure by the brightness of the image on the ground glass.

The average exposure in bright sunlight, in this climate, Southern California, is three quarters of a second at F/8 (U. S. 4) for general landscape subjects, whereas in northern Washington the exposure under like conditions would be a full second. I might here sound a warning against under-exposure, which under all circumstances is fatal, giving dense positives and false colors.

It is always better to err on the side of over-exposure, which may be indulged in to a greater extent than is generally known, in fact I purposely over-expose all my plates, to the extent of one third to a half more time than a correct exposure would call for, as this gives, when backed by proper development, very thin transparencies with true colors, which are most desirable for lantern-slides. My slides are almost as thin as ordinary transparencies, and will project by any light.

As stated, I am a great believer in generous exposure, and work with a highly restrained developer, using ten to fifteen drops of saturated solution of Bromide of Potassium, to one and a half ounces of diluted developer. This method gives me very thin slides with true color which I have no difficulty in projecting one hundred and fifty feet and enlarge the image up to sixteen by twenty feet.

There has been a lot written about the exceedingly small latitude of the autochrome plate, but I find that they have much more latitude than is commonly supposed. For subjects of extreme contrast follow out the golden rule of photography, expose for the shadows and develop for the high lights, using a very highly restrained developer, and there will be no difficulty in holding contrasts, fairly deep shadows and strong highlights. It is always well, when working with very contrasty subjects, to choose a rather dull day for then the lighting of the shadows is much stronger than in bright sunlight.

Sunsets are the hardest and yet the most effective things to photograph by the autochrome. Each one calls for different treatment, so no absolutely correct table of exposure can be given. One must learn to judge the exposure in this case by the ground glass; however, the rule of generous exposure and restrained development holds good. Care must be taken not to over-develop and so burn out the sky. The following table is fairly correct for sunsets:—

Exposure for Sunsets, at F/6.8. (U. S. 29.)

60	minutes	before	sunset	....	1 second
45	"	"	"	....	2 "
30	"	"	"	....	4 "
15	"	"	"	....	8 "
5	"	"	"	....	15 "
1	"	"	"	....	30 "

This table applies to sky with light clouds; if the clouds are heavy and banked up, the exposure must be considerably increased.

In taking sunsets with landscape foreground, the sky ought to be exposed for the proper period, and then shaded by a card held in front of the lens, so as to dodge the sky and give the foreground a prolonged exposure. In this manner very pleasing results are obtained, which otherwise would be mere silhouettes. I do not mean to convey that silhouetted foregrounds are detrimental to sunsets; on the contrary, they are most effective and are very much to be desired from a pictoralist's standpoint, as the glint of clouds over the somber foreground are most pleasing.

One point which is being raised constantly is the inability to duplicate the autochrome, but this can be overcome in two ways: the first is to make an autochrome negative, which means that the reversing process is omitted, the plate being simply fixed after the first development. It is then a negative in the complementary colors, from which any amount of positives can be made, care being taken to use the same color screen and source of light, with which the original was made. The second method is copying the autochrome in the camera, against a perfectly white light, such as a white cloud.

The autochrome also can be used to make enlarged pictorial negatives, by simply using it as the transparency, and enlarging on an orthochromatic plate, taking care to use a five time screen.

It is to be hoped that the reader will give this most fascinating branch of photography a fair and impartial trial, and the writer will be recompensed in knowing that he has started some one on the road to real picture making.

A FOGGY MORNING. CARL A. PETERSON.

PHOTOGRAPHING PLANTS IN THEIR HAUNTS

By A. B. KLUGH

THE photography of plants in their native haunts is a most fascinating pursuit. It takes one out into the woods and fields, it brings one into very intimate contact with nature, and the results obtained are not only beautiful as pictures but possess a scientific value.

The camera to be used in plant photography must have a long bellows, that is, must be double or triple extension, so that near objects can be brought into focus. It is also essential that it be provided with ground-glass, and for this reason roll-film cameras are practically useless for this work. The camera should also be light and compact, since it will be carried on long tramps. 3¼ x 4¼ by 2½ by 3½ are suitable sizes, as they give contact prints of decent size, give good lantern slides by contact, and from good negatives enlargements can be made to any desired size.

A tripod is absolutely essential, and I have found that a metal telescopic tripod is perfectly satisfactory. I have heard a good deal about the instability of these tripods and the troubles arising therefrom, but I have used one in the taking of hundreds of photographs and have never had a picture spoiled by the shaking of the camera. I had a leather scabbard made for my tripod and carry it slung on my belt.

An adjunct to the tripod, almost as necessary as the tripod itself, is a ball-and-socket head. This useful attachment not only enables you to alter the angle of the camera without shifting the legs of the tripod, but allows you to use the camera pointing vertically downward.

In plant photography orthochromatic plates should of course be used exclusively. I have done a great deal of experimenting with different plates, and for all plants, except those with red flowers, I prefer the Imperial Non-Filter, or the Ilford Screened Chromatic, as these plates give correct color-rendering without the use of a filter, thus doing away with the prolonged exposure necessitated by the use of the latter. For red flowers a panchromatic plate is required, and this should be used with a properly corrected filter, of such depth as to increase the exposure from five to eight times. Plates should always be backed, as a backed plate always gives a better rendering than an un-backed one, and considering the slight extra cost of backed plates, I deem it a poor policy to use an un-backed for any purpose.

Figure 1.

DUTCHMAN'S BREECHES.

When on an extended trip under conditions where weight is a serious consideration, and when facilities for changing plates are poor, it is best to use a film-pack in an adapter. I have recently tried Ansco film-pack with a filter in this work and found it to give excellent color-values.

When one is about to take a photograph of a certain species it is a good plan to devote a little time to selecting the most typical and the most favorably situated specimen which can be found in the vicinity, and having selected it to study carefully on the ground-glass the best side and the best angle from which to take it.

In plant photography it is rarely advisable to use a large stop, as large stops do not give enough depth of focus. What stop to use depends entirely on the depth of focus required. In the case of a bed of plants, especially if some of the plants are near the lens, it is necessary to use F/45 or F/64 in order to bring all the plants shown into focus. And nothing is more aggravating to the eye than ill-defined blotches in a background. If all the plants lie pretty much in one plane, and if the background is of such a nature that it may be thrown out of focus without resulting blotchiness, F/16 or F/22 may be used. As small stops must be used a rapid rectilinear lens gives practically as good results in this work as an anastigmat.

Wind is the bete noir of the plant photographer. The ideal day for work is one with no wind and no sunshine—a cloudy-bright, still day—but such days are rare, and on days when one would declare that there was absolutely no wind he will find that there is breeze enough to cause flowers on long slender stalks to wave gently, but most aggravatingly, to and fro. But I have at last settled the wind nuisance. I made a little tent of white silk, four feet in height and four feet in diameter when erected, which I set up on a tripod of sticks over the plant I wish to photograph. This tent folds up into a little bundle which goes easily into the pocket and weighs but a few ounces. The tent is set up so that the door is on the lee side, and the camera is set up outside the tent with the front in the door. This tent enables me to work in quite a stiff breeze, and while a plant under the tent requires double the exposure that it would need in the open it does not matter as the plant is perfectly motionless.

A plant should never be photographed in the bright sunlight because of the heavy cast shadows and because the delicate tone-gradations are lost. Here again the tent is useful, as it acts as a sunshade.

Some plants are too large to allow one to photograph them in so small a tent without showing the wall of the tent, and with such plants one must wait for a still day. In such cases the tent may be spread out flat as an awning to keep off the direct sunlight.

LANDSCAPE.

In the matter of exposure the best advice I can give is to use the Wellcome Exposure Calculator. Use the subject factor 3 if the plant is in the open, and the factors 8 or 12 if in the woods, the choice between the last two factors depending on the depth of the shade. One very important point to remember in calculating exposures in plant photography is to allow for the increase due to bellows extension. The rule is that the square of the focal length of the lens is to the square of the bellows extension as the normal exposure is to the

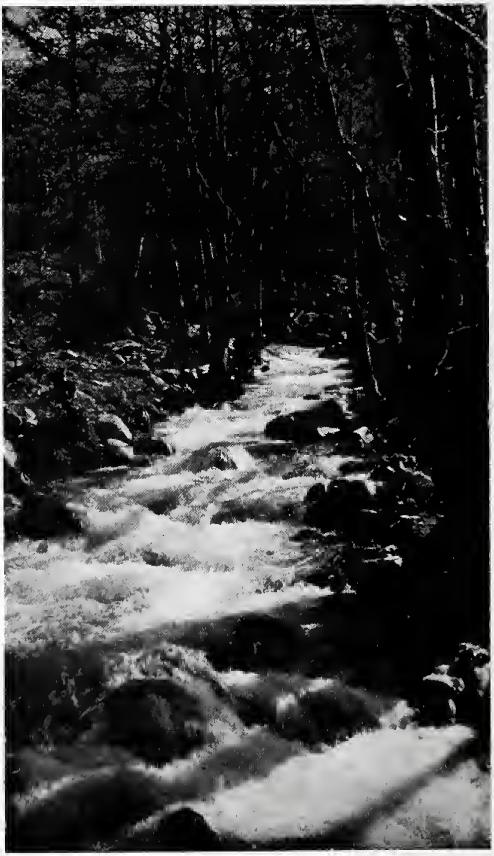
Figure 2.

TWIN-FLOWER.

required exposure. Thus if we have a lens of 5 ins. focal length and we use it at an extension of 10 ins., we have 5 x 5 is to 10 x 10 as 25 is to 100, or as 1 is to 4, and we must therefore give four times the exposure which would be required if the lens was focused for infinity. It is a good plan to work out the factor for each extra inch of extention, and to make a note of the position of the lens on the camera bed at each extension, thus—"Ext. of 7 ins. (at pinion-head)= X 2; Ext. of 8 ins. (at end of front-board) = X 2 2/3," and so on. Then paste this little table below the dial of the calculator.

In developing one should aim at securing a negative which is "crisp" and yet has good detail in the shadows. It is best to use a time and temperature system and to choose a medium contrast factor.

In making contact-prints I find that P.O.P. gives far better detail than the gaslight papers, and after trying practically everything on the market, I have settled on Glossy Seltona as the best medium. The prints should be ferrotyped. In making enlargements I find that Studio Enlarging Cyko gives excellent results.



SAN ANTONIO CANYON STREAM, CAL.
FREDERICK G. CALKINS.

HELEN CONAN. CLARISSA HOVEY.

HALATION

By MARCUS G. LOVELACE

Lovelace Research Laboratory

IN one of the standard works on photo engraving, the statement is made, "Every engraver has his own infallible remedy for 'devil' marks, or just plain devils—which remedy nearly always fails when it is most needed." In the same way there are many remedies for photographic troubles which are perfectly satisfactory until they are needed when it is too often found that they are of no avail. There is so much written today along photographic lines that should be written for the waste basket that the only wonder is that the amateur who goes past the kodak stage ever gets anywhere. The world today seems more than ever a mass of false prophets so far as cameras go, and the astounding articles that appear in most of the magazines only add fuel to the flame.

The man with the portable dark-room has not yet disappeared, although many of his victims who have wrestled with these 2 x 2 x 1 infernos doubtless would lead him to a speedy death with joy. The man with the wonderful lens, and the man who works by "common sense" too, seem to have more lives than the proverbial cat. A careful perusal of the pages of the current periodicals will also show that the condenser-less enlarger is still at large—no pun intended—but seems to be in the last stages of decay. There will come a time when not more than one enlarger in one thousand will be made without the use of condensing lenses, and in that day some amateur, or alleged professional, will arise and with much noise apprise the waiting world that an enlarger can be made without the use of a condenser, by the use of a matt reflector, and then the whole thing will go its weary round again. There has been, and is, so much written that can only be called "piffle"—caused doubtless by a mad desire to rush into print at any cost, and fostered by the difficulty of getting good articles for twelve months in the year by the magazines.

WOODLANDS. THEODORE EITEL.

In a recent number of one of the foreign magazines there was an article on color photography by some nameless person (a contributor—not a staff writer) giving a long list of factors and data with regard to the exposure and development of the autochrome. Disregarding the fact of a special color plate meter being on the market, and glibly saying that he does not use tables or anything of that sort, he goes on to give a long method, which (aside from its being false in theory as well as practice) is certainly not suitable for use anywhere except in a laboratory. And many a poor amateur will waste his time, his plates, and seriously endanger his chances for ever-lasting bliss, by endeavoring to follow out these instructions.

In a British weekly some time ago there was an article on a new exposure meter, which was to supplant all other meters and methods for determining light values, and which should be made a part of the curriculum of the public schools according to the writer. It involved a new series of stop values—a new unit of light—the use of a very inferior, unscientific standard of light, and which by careful study could be mastered by the average amateur in a few days. For the man who devised it probably it is entirely satisfactory, but whether it would be workable by the average man is yet to be proved. These things could all be avoided by the establishment of some sort of national society like the Royal Photographic Society, whose dicta would be the hall-mark of efficiency and utility, and whose judgments would clear the air of the wild notions which are going about.

The question of halation is another of the moot ones of the quasi-expert. I have read all that is written on halation, so far as I know, and have read all the remedies for it, have tried them all, and with very few exceptions have found them worthless. Most of us are familiar enough with halation to do comfortably without any definition of it, so that I will only talk of the causes and remedies.

Halation, of course, is worst where a dark shadow has a sharp edge against a strong light, as the old case of the interior with windows in front of the camera. Hance, who is one of the most successful of all commercial photographers, says, "Darken all the windows, in front of the lenses, make exposure by remaining windows or flash light, and give short exposure to show detail through windows." Best way of all, unquestionably, but not always available.

Then comes another man who says, no alkali in developer, or at most only a trace. Another method is the use of acetone or acetone sulphite instead of alkali.

Then there is the double coated plate—the plate with a red film between the emulsion and the glass, the backed plate, and the various plates containing derivatives of hydrazine, or other bromine absorbents. The film I have left out, as it will

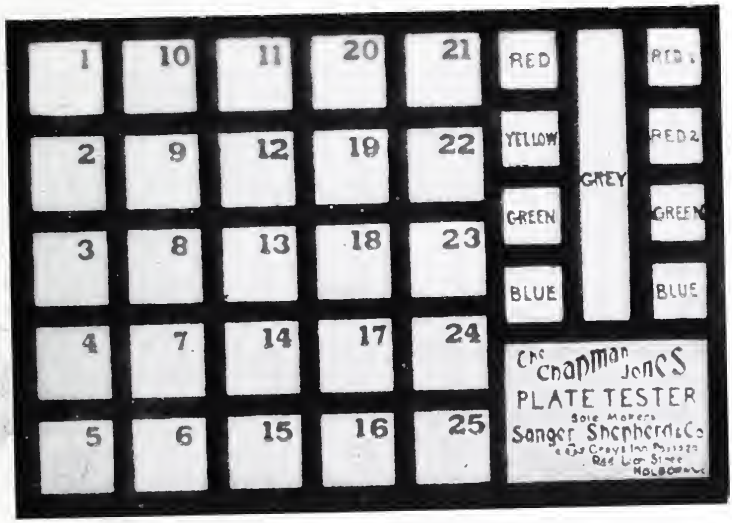


Figure 2.

only give halation under certain conditions, which are somewhat unusual.

Halation is supposed to be reflection from the glass support, and while this is true, it is only a half truth. Halation is about half under-exposure and about half reflection from the glass. Lean emulsions, low in silver content, also tend to give halation. Testing for halation in a laboratory may be done by photographing a slit illuminated by an arc lamp or day light, but for most work the Chapman Jones Plate Testing Apparatus serves every purpose. For the benefit of those who are not familiar with this handy little device, I will explain that it is simply a test plate in a special holder, mounted on a stand with holder for a standard candle. On placing a plate to be tested in the holder and giving proper exposure to the light of the standard candle (all in a dark-room, of course) and afterwards developing and fixing, we can arrive at a good many of the facts regarding the plate with sufficient accuracy for ordinary purposes. For anything more than rough testing, of course, it is too simple and crude an apparatus, but the facts in which the average photographer is interested are easily found and clearly shown, and the results are sometimes a good deal of a surprise after reading what the advertising man has written about the brand tested. Figures 1 and 1a are pictures of the instrument itself. Figure 2 is a diagram of the test plate. In Figure 2 the squares numbered 1 to 25 are

Figure 1.

a series of graduated densities, from clear glass to almost perfectly opaque, certainly a denser black than is found on any negative, save perhaps a wet-collodion process plate.

Squares 1 to 4 and the strip 5 at the right end of the plate are four squares of color and a strip of neutral grey respectively, and are all of practically the same visual luminosity, and constituting the simplest form of the Abney Color Sensitometer. Squares 6, 7, 8, and 9 at the right end are four carefully selected portions of the spectrum, chosen as giving the most useful general information. No. 6 transmits all the light the ordinary, non-ortho plates are sensitive plates record—that is as far as line E or b in the spectrum. No. 7 transmits from E or b to D and this with No. 6 represents all the portion of the spectrum that ordinary orthochromatic plates are sensitive to. The first red square—No. 8—represents the red that some ortho plates are sensitive to when the extreme red is reserved for a dark-room light, namely D to C in the spectrum. No. 9 transmits only the red beyond C.

In the lower right hand corner is a line negative over which is superimposed a half-tone negative from a plaster relief.

The whole instrument from the makers, Sanger, Shepherd & Co., London, costs about fifteen dollars with duty, and is well worth buying if one does any great amount of work. It is possible to determine the speed of a plate, range of gradation, sensitiveness to color, possible range of exposure, grain

Figure 1a.

of plate under different conditions, amount of halation, most suitable developing light, filter factors, etc.

Now for some results: It is almost impossible to reproduce these test plates on paper on account of their long scale of gradation which the paper will not reproduce. Possibly the publishers of the annual will be able with soft working collodion to get cuts of them that will show the results—if not, my readers will have to take the editor's word for my plates bearing out my statements. [Unfortunately the plates submitted could not be satisfactorily reproduced, but I can assure our readers that they fully corroborate the description as given by Mr. Lovelace.—Editor.]

Plates 1, 2 & 3 are the best plates made (this is my opinion of course, not yours, unless you use them) and I have no hesitancy in saying that they are Wratten Panchromatic, made by The Eastman Company. I have only good things to say of them so that it does no harm to give their name. Plate numbers 4, 5, & 6—well, they show why I cannot tell the brand, I think without any explanation. Plate numbers 7, 8, & 9 are pieces of Kodak film taken from a trade roll.

No. 1 was exposed 30 seconds to standard candle, room temperature 68 deg. Developed in 1:15 Rodinal by inspection, factorially.

No. 2 was developed in the developer recommended by several writers on interior photography—starting development with only a trace of alkali and continuing development for a long time, which is claimed to give non-halation results on ordinary plates. In this case the developer was metol-hydroquinone according to the thermo formulæ of Alfred Watkins,—but using 1 cc. of alkali instead of 50 as called for. The alkali used was C.P. Sodium Carbonate, by Baker and Adamson. No. 3 is developed in the same manner—with practically no alkali—but with the backing of the plate removed before exposure.

Next the —— plates. Unbacked plates of good make, non-ortho. No. 4 was developed in 1:13 Rodinal. No. 5 in the developer without alkali—and number 6 in the same developer but with a black backing applied to the plate. Lack of space will prevent me giving any more specimens, but it was found that with the Wratten plate it made practically no difference what was used for developer, as long as it was backed, while with the other plate of much higher speed the developer seemed to have little effect, on halation, no matter whether it was backed or not. Furthermore, the second plate mentioned gave much halation no matter what backing was used. Many developers were tried—acid amidol, which works in an acid state and which by the alkali theory of halation should give no halation, gave a plentiful amount—Dianol and amidol not acid made with sodium sulphite, and the results were practically the same, bearing out the conclusions arrived at by the writer about a year ago—that halation was partly plate—partly backing, and partly exposure. As a general thing a

AN OLD KITCHEN. T. F. BROGDEN.

high speed plate is more prone to halation than a slow plate, and as the slogan of the plate makers seems to be—the cheaper the plate, the higher the speed—the majority of cheap plates, and of non-ortho plates give more halation than picture, under trying conditions. Films will give halation under proper conditions. If any one wishes to test this, let him select a house facing east, wait until the sun is obscured by the house late in the afternoon, and then make a very short exposure—25th of a second, at F/8 at 5 P.M. in summer. Over the top of the house will stream halation for just one reason—under-exposure. Give the exposure indicated by a Watkins meter (and without dividing the stop aperture by half the value of pi, multiplying by 38 and squaring its cube, as indicated by some of the new exposure ssytems), you will find that the halation will disappear. In the first case a dark shadow with a sharp edge comes squarely against a very strong light. Before the shadow has had any exposure within the limits of the plate the shutter closes and leaves a blank mass of undeveloped silver in juxtaposition to a large amount which has received full exposure. It is possible that a continuating action takes place here which will extend from the mass of silver which has received full exposure to that which has not. In consequence of this action being greatest at the point of contact, we will get the greatest density at the point of contact, and a gradual lessening of the effect as we get farther away, giving the familiar smoky effect which trails off into nothingness as we get farther away from the source of the halation. Under the conditions of the Chapman Jones Apparatus it is impossible to produce halation on films. By using a slot illuminated by an arc light in a darkened room, it is possible, for the reason that I have just stated—extreme under-exposure in the shadows and exposure in the high lights much in excess. I have three films—Nos. 7, 8, & 9, which were made by the Chapman Jones apparatus, and developed as follows—No. 7 in no alkali developer, No. 8 in 1:15 Rodinal, No. 9 in thermo M.Q. (Watkins.) I can see no difference that amounts to more than the variations in temperature, or the personal equation, except No. 7 which seems to have a little flare around the first few numbers. No. 9 developed in M.Q. seems a little clearer than the others, although this may be due to some slight unnoticed variation in the handling.

The bulk of the evidence then seems to point to halation being more of a matter of exposure and plate than of developer and plate. Cheap foggy plates are more prone to give halation than the better class of plate. Developers seem to have little to do with the results attained, and so far as has been tested, temperature seems to have little to do with it. Backing does help a great deal, with a good plate—with a poor plate there is so much creeping of image that backing the plate seems to do little good. Taken all in all, Mr. Hance's method seems the most generally satisfactory, all things considered—that is destroying the cause of halation with a heavy curtain over the offending light. In the case of the house referred to in the production of halation in a film, it would be difficult to hang a background behind the house, and in that case the only thing to do would seem to be to wait until the sun was on the other side of the house.

All that is needed to disprove all the theories of avoiding halation by no-alkali development is to try them. If as one advocate of this method advises, you over-expose your subject then you can get a fair result—with any developer, not the non-alkaline alone, but with any. The crux of the whole matter is that the shadows get enough exposure. He who preaches this idea the loudest, "Give four or five times the exposure that you would ordinarily and then develop with developer made up without alkali, adding a drop or two of a 10% solution of sodium carbonate as development goes on—but you must give plenty of exposure." He does not say, however, that given this full exposure any developer can be used. He does not say furthermore, that the plates he uses are a slow plate, such as used to be called a landscape plate, because a landscape, or a tombstone, was the only thing that would keep still long enough to get a record of it, on the plate. Double coated plates are good, but they will not prevent halation if they are given such an exposure that the top emulsion (the fast one) does not get enough exposure, but will give considerable halation. The reason they generally give such excellent results is simply in the fact that the users know that they are of a very great latitude—that they are generally used in interiors—where there are heavy shadows, and in order to get detail in the shadow, the plate is given several times the exposure that would really be needed. That is partly the success of the Hydra plate, that being practically unlimited as far as over-exposure goes, it usually receives very generous exposure—sufficient to give shadow detail at least, and the latitude of the plate is so great that the high lights are taken care of. It may be said that this will not hold in the case of night photographs, but the first night pictures that were made, that were successful were made in 1896 by Paul Martin of London, on back plates, with 1:100 rodinal as giving time for the entire depth of emulsion to become saturated with developer before development started to any great extent, and working for softness. The same system of working, without all the fuss about adding a few drops of alkali at a time. Personally I have never found any cases of halation which could not be avoided by using a backed plate and full exposure. While this article was in preparation a case of halation arose which comes under this explanation—and which serves to bear out the contention. A chart was being photographed, consisting of a black ground with white letters and a white label a couple of inches square in the centre. The operator using a Seed Process Plate gave just sufficient exposure to get an image of the letters on the chart. The larger piece of white paper—much lighter in tone than any of the letters—had a fine crop of halation around it. On backing the plate this disappeared, and a test made of the effect of giving full exposure on a faster plate proved that the halation was simply a case of unbacked, under-exposed plate.

The writer wishes to call the attention of the readers of the Annual to the statements found in Watkins, "Principles and Practise of Photography, Anent Developers." If the amateur would read a little with regard to the theory and practice of development the pages of the periodicals would be freer from piffle, such as has been only too common in the last year. It is probably a sad and yet true fact that of all the amateurs in this country not more than one per cent know anything of the theory of development, of exposure, of the constrution of the lens they are using, or in fact, more than some printed sheet of directions. The professional boasts of the fact that he works "by experience." There is a proverb which

PORTRAIT. E. O. HOPPE.

says that he who is self taught has a fool for a teacher, which is very much apropos, at this point. Books are available. One college in this country has a first rate course in photography, and yet we find some of the institutions which are supposed to turn out photographers leaving out the theoretical side altogether. There is too much practice and too little brain—that is the trouble with the amateur and the professional as well. The amateur who will take the time to do a little studying will put money in his pocket, pictures on his walls and envy in the hearts of his competitors. Two quarter plate film packs will pay for an exposure meter—(and don't you believe any of the old story of the professional knowing how much to expose—take him out of his gallery and he's about as helpless as the amateur), and you will get results.

The real effect that is produced in the emulsion by light action is very obscure. Practically all that is known is that the developer will rob the emulsion of its bromine, leaving silver alone, wherever there has been any light action, while in the portions of the plate where there has not been any light action, such robbery will not take place. The action of light serves then to either weaken or break the link which connects silver and bromine, which form silver bromide. Much has been written pro and con on this point. In one case the supposition is that the change in the silver salt is physical—that is an alteration which does not affect its composition but only its structure. Water in its three forms—ice, water and steam or solid, fluid and gas, while still water—is an example of this physical change. Thus the silver bromide in the emulsion after exposure to light would still be silver bromide, but in such a state that it was developable. A chemical change on the other hand would presume that the composition of the substance was changed. The silver and bromine in the emulsion in this case would separate completely. A chemical change is always preceded by a physical change—there must be some alteration in the body of the molecule before actual decomposition takes place, and the question therefore seems to be whether the change is physical only or whether it is first physical and then chemical.

Chapman Jones is a strong advocate of the theory that the action ceases with the physical, but he has many opponents as

SISTERS. Harold Cazneaux.

well as many supporters, and the whole question is rather a difficult one to do anything with on account of the extreme difficulty of proving anything either way. So little is known with regard to the laws concerning these obscure changes that any theory is probably mere speculation, but there is considerable evidence of a continuating action in many photographic as well as many purely chemical problems, so that it is not unreasonable to suppose that this may be one of the contributory causes of the much debated halation. Backed plates, or the use of a reversed ground glass and a reversed plate—that is exposed through the glass—and ample exposure will avoid it in any case where it is a source of trouble, and the advocates of the various freak developers destroy their own cause by their statements—"Halation is caused by reflection from the glass back of the film." "Halation is more common in glass plates, because light is reflected from the glass to the back of the film," etc. If light is reflected from the glass of the plate onto the back of the film it will produce a developable image. If an image is *developable, any* of the developers used or recommended for this method will *develop* the image of the reflection from the glass *just as readily* as it will that which struck the front surface of the film in a lawful manner. On the Pacific Coast there used to be an expression, "Making a living with a trained deck," applied to professional gamblers. If the advocates of the non-alkaline system say true, they have gone beyond the above mentioned gentry, in their efforts, as they have produced a developer which looks carefully at every silver molecule, and figuratvely divides the sheep from the goats by deciding which ones it will develop and which ones it will not.

That halation is not always caused by reflections is proven by the night pictures on films which often show a plentiful crop, quite as much as plates, and yet on ordinary subjects films usually show very little.

To sum up therefore—halation is not entirely due to reflections from the glass support, but only partially so—it does not depend on the developer at all—relation of exposure to subject as far as contrast goes has something to do with it—quality of emulsion has a large bearing on the amount of halation produced, a poor lean emulsion prone to chemical fog will always give it more readily than a first rate plate. Attempting to force under-exposure is a very large factor in the amount produced, and lastly backing in one of its many forms will largely avoid the worse forms of the evil. A backed plate, of good quality, with generous exposure, properly developed (tank or factorially) will not give halation to a sufficient amount to be detrimental to the finished negative. Poor plates, under-exposure, lack of backing and forced development are the things necessary to produce halation in any quantity you like.

I am aware that these statements will probably fall on militant ears as far as the advocates of non-alkaline developers go, but the only real difference between the conclusions we have arrived at is that ours have been achieved by careful experiment, and that we have reached a point where we can produce halation or not by the very methods that these same "practical" men are using and not vary from their methods, by simply varying the plate or the time of development. There has been too much of this "hard practical experience," "little pocket note-book exposure system," "developer that will raise the dead," "don't bother with an exposure meter." The magazines have been clogged with it for years, the annuals get their share and the poor benighted amateur wanders around in a fog of formless ideas, that are foisted upon him by every so called "practical man of photography." From my experience the practical man in chemistry is the man who knows that if you add 10 cc of A to 50 cc of B and then boil for three minutes and add C in small quantities you will get your result. If any of these factors happen to be varied he is lost—he is simply in the position of a highly trained animal. The practical photographer is in exactly the same circumstances—these things cannot be of a practical nature without being of a theoretical nature first if any success is to be attained. The man who works by rule of thumb is doomed—civilization has no place for him.

If the photographic magazines of the country could join forces and submit every article on theory in photography to a man such as E. J. Wall of Syracuse University, for his opinion—not as to its worth, but simply as to whether it was scientifically true or not, from the view point of the unpreju-

CLOSE OF DAY. JAY SATTERLEE.

diced scientist, there would be a great clearing out of all the rubbish that constitutes—alas—so large a percentage of all the current photo literature. This would do away with the crank who was constantly pushing some pet scheme of his own, and the things which would be wonderful if true, that editors accept largely because of a paucity of really good material. We tolerate these things in matters relating to photography—but how long would it take to get rid of a school teacher who taught that two times three is five, even if he taught for nothing. Possibly I may be a little sensitive on these points, but in the course of a year's work I come across the trail of these things in so many forms—so many questions are asked that on examination prove to be the outcome of some article on "How not to do it" in one of the magazines, and like the old beer or treacle preservatives in the days of wet collodion, they would do splendidly with one man and fail with another from some small variation in the qualities of the articles used by different persons, in different places.

LESSER BLACK BACKED GULLS. COPYRIGHT, BY CHARLES KIRK.

PORTRAIT. BELLE JOHNSON.

WITH THE CAMERA ON DESERT TRAILS

By S. H. WILLARD

THE desert seldom photographed and looked upon with horror by the average person offers opportunities, many and unique, to the pictorial worker in photography. The idea held by most people that every mile of the desert is like every other mile could not be a more mistaken one.

Let one take his camera, canteen, blankets and provisions, and go out for a week's stay in the desert solitudes, and he will always come back deeply impressed by its supreme majesty and awful mystery. The mystery of the desert fascinates one, once having been in the desert enough to really understand it, you always want to get back in its solitudes.

Photography in the desert is at once easy, and extremely difficult. Easy, because the light conditions are much more constant than in other climates. Difficult, on account of the subtle colorings and atmospheric condition found only in arid regions.

Short exposures are almost the rule, perhaps even shorter in some parts of the desert, than along the seashore. A quick development in a strong solution helps to bring out necessary contrast.

Orthochromatic plates and films should always be used, as the cloud effects in the desert are often of the most brilliant character, and when the light conditions are right, the colorings are vivid almost beyond belief. Thus most desert subjects are eminently suitable for the colorist and worker in color photography.

In taking photographic equipment into the desert, take every precaution to amply protect it against sand, dirt and heat. I once lost some fine negatives through sand entering the camera during a sandstorm. A good plan is to enclose everything in stout canvas bags. It is best not to take too large an outfit, as extreme heat makes travel uncomfortable under the best conditions.

Figure 1.

SALTON SEA, COLORADO DESERT, CALIFORNIA.

Illustrating article "With the Camera on Desert Trails," by S. H. Willard.

In the desert one often happens upon the most unique, and unlooked-for scenery. Take for instance palm canyon in the Colorado Desert of Southern California. This is the home of the California palm, and along the stream of alkali water these palms grow to an immense height. Above their brilliant green tops one sees the snow capped summits of a high range of mountains. The palms, the snow, and the surrounding desert combine to make a picture which could not be obtained elsewhere in the world.

The Salton Sea (Figure 1), also in the Colorado Desert, is another very unique subject. An inland sea in one of the most desolate regions of North America, with a most brilliant play of color upon the sea and distant desert mountains is a surprise to every one.

Finally, I would say that if the landscape photographer would give the desert a little time, study and attention he would be more than repaid.

WATER-LILLIES. HARRY GORDON WILSON.

ANCIENT AQUEDUCT, CITY OF MEXICO. GEORGE L. BEAM.

A SIMPLE HIGH-POWER PRISM MONOCULAR WITH FINDER

By HENRY F. RAESS

IN my article in the "*Annual*" for 1913, on page 173, I spoke of a simple home-made telescope, made from a single combination of a thirteen inch rectilinear lens and a Huyghenian eye-piece.

While experimenting with several pieces of optical apparatus the thought suddenly occurred, What would be the effect of substituting the objective of the prism binocular for one of longer focus?

Since the focus of the binocular's objective was rather short one of longer focus ought to give a larger image, so the single combination used in the above mentioned telescope was roughly tried and it was found that a much larger image resulted.

Encouraged by these results, arrangements were made whereby the single combination could be easily attached to the binocular. (Figures 1 and 2.) A brass tube one inch long and three-quarters of an inch in diameter, threaded on the outside, was obtained from a mechanic for twenty-five cents. This tube was to screw in place of the binocular's own objective.

A tinsmith made another tube to take the place of the tube carrying the eye-pieces of the above telescope. One end of the "tin" tube was closed and a round opening cut in it, into which the little brass tube was soldered. This arrangement permitted screwing the telescope, minus the Huyghenian eye-piece, into one of the tubes of the binocular. A rough focus was obtained by sliding the larger tubes in and out and the final focus with the fine adjustment between the two eye-pieces. The result of the experiment was very pleasing, the image was much larger than before (in fact the ten power had been changed to a thirty), but the angle of view of course was less.

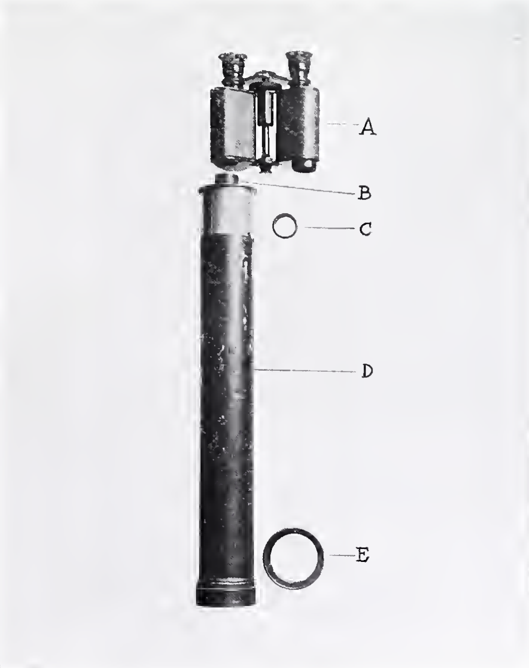


Figure 1.

Figure 2.

Illustrating article "A Simple High-Power Prism Monocular with Finder," by Henry F. Raess.

On account of the smaller angle of view the image sought was first centered with the ten power and then it was easily found with the higher magnification.

The cost of the two tubes was seventy-five cents and to my knowledge the highest powered prism monocular is eighteen and is quite expensive. Incidentally I might mention that the moons of Jupiter can be seen by this instrument.

ADVENTURE. KATE SMITH.

THE WHITECAP. J. R. PETERSON.

HOW TO IMPROVE ONE'S NEGATIVES

By ALBERT J. TREICHLER, M.D.

FEW among the average amateurs ever think or try to improve their negatives. If their negatives prove to be correctly exposed, rightly developed, and artistic in composition, they are satisfied. They will fill up pinholes and scratches with opaque, intensify the negative if it be thin, and reduce it if too dense. Having done this they stop, believing that all that can be done has been accomplished. They know that professional photographers always retouch and otherwise improve their negatives. They also believe that the art of retouching is limited to portrait negatives.

In this brief paper I shall not go into the details of general and local reduction or intensification by chemical means. Nor shall I mention the working in of backgrounds and other accessories. These methods are fairly well known and are fully described in any good photographic manual. I shall rather tell of the mechanical means so seldom described in textbooks, but to be found scattered in photographic periodicals, or to be learned by those that practice them.

A critical worker will very seldom be satisfied with his negative and will usually find some defects and imperfections which he wishes to correct. These defects and imperfections are varied, such as markings due to dust particles, scratches and air-bells; exaggeration of light and shade; contrasts due especially to under-exposure or false lighting. Then if some undesirable objects could be removed or made less conspicuous, the negative would be improved. I mean such objects as telegraph poles, lamp posts, an ugly fence or sign; branches and twigs of trees; glaring portions of architectural subjects, etc. Where is the photographer who has not wished some of these things eliminated or subdued from an otherwise perfect negative?

A good advice is this: Take your time in composing your

A RAINY NIGHT. ALBERT J. TREICHLER, M.D.

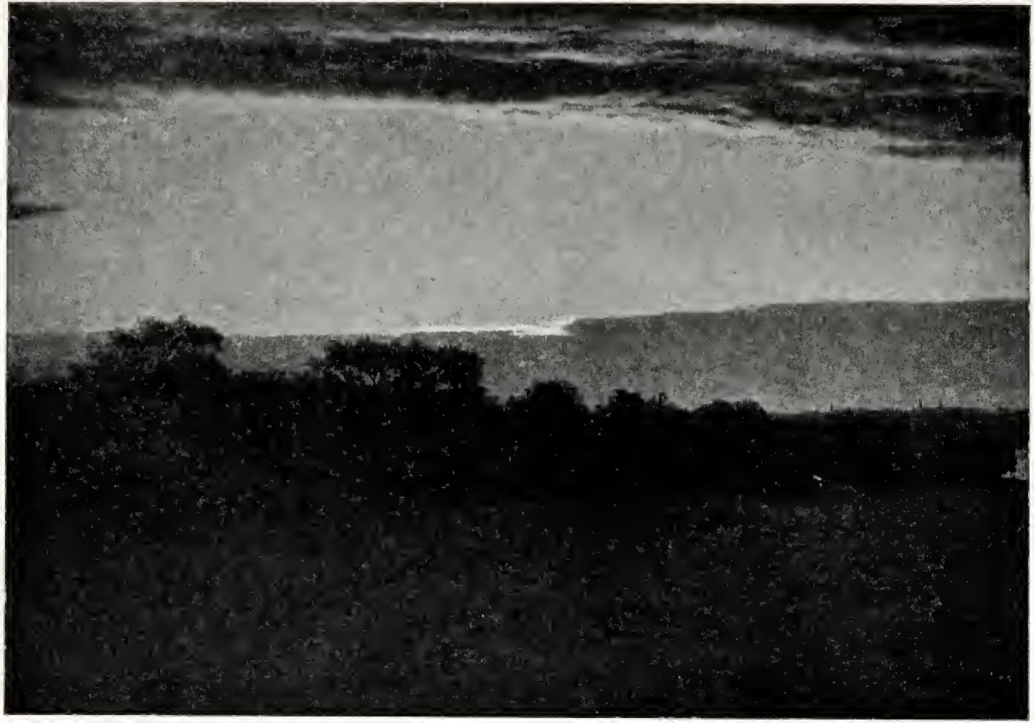
picture, focus it for the effect you wish to reproduce, give the correct exposure, and develop for the degree of contrast you like best. When the negative is dry, make a proof and study it carefully and critically for imperfections and defects. Then think how you can eliminate these and otherwise improve your negative.

When you have a clear idea of what to add and what to take out, go to work and do it as best you can.

If some parts of the negative are too thin, or a shadow prints too dark, you will find that some pencilling here and there will soften the part. This you will do on the film side, previously coated with retouching fluid, and using not too hard a pencil. With the pencil you will also be able, as a rule, to remove or soften the undesirable objects previously mentioned. If the result is still unsatisfactory to you, turn the negative over and work on the glass side. Coat this with matt varnish and work on it with powdered crayon and stump, or with a brush dipped in water color and gum arabic. The most suitable colors for this kind of work are ivory and lamp black, sepia, vermillion, Venetian red, Indian red, lake, carmine and French blue. They are sold in a moist state in tubes or pans. Aniline and other colors recommended for coloring photographs and lantern slides are not so suitable for this kind of work as the moist water colors.

Hinton, the great English pictorialist, improved his negatives by the following clever method. Take a piece of very fine tracing paper, or paper mineral, as free from grain as possible, wet it with water, and smoothly stretch it on a blotter. Run a little mucilage or paste along the borders of the negative on the glass side. Place this on the wet paper, press firmly and lay on edge to dry. The paper will dry in a few minutes and will adhere to the glass without wrinkles. Now work on the paper with pencil, stump and crayon, or brush and color to add density where the negative is thin. Should you wish to render the paper more transparent in some parts, paint it with Canada balsam dissolved in turpentine, one dram to the ounce.

For local reduction, very fine pumice powder, emery of the finest grade used by opticians and jewelers, or ground cuttle fish bone and resin mixed in equal parts, are very useful, but



EVENING GLOW. S. P. Emerick.

must be handled carefully. Take some of the abrasive on your finger tip and rub it on the part to be reduced in a circular motion. If the part is too small for this, use the abrasive on the point of a paper stump. Or you can use in the same way a rubber ink eraser. In this way you will render the film more transparent, thus allowing more light to pass through it during the printing process.

There are many other ways to improve one's negatives. They can be found scattered in photographic literature and it will pay the earnest worker to study and practice them. By adopting these methods many negatives will be saved from the rubbish pile and will add to the pleasure of the photographic worker.

A TRIBUTARY OF THE RIVER DEE. ROBERT C. DAVIES.

THE LITTLE AUTOCRATS—THE BABIES

By JESSIE ROBINSON BISBEE

BABIES—how could we manage to run our studios without them? Of course, a few studios have their particular lines of work, their theatrical trade, men's trade, or some other specialty, but these studios are few in number. Most of us photograph all who come for a sitting who are willing to pay our price. What would we, who own and operate such studios, do without the babies?

Laying aside the tenderness of the case—if, indeed, any of us can consider babies in any other light—what would we do without the little folks? What would become of the cash-book in many modern and progressive studios if those rosy, dimpling little money-makers, the babies, should suddenly and fully withdraw their smiles and their patronage?

We all agree with Longfellow's sentiment—

> "Ah! what would the world be to us
> If the children were no more?"

Did you ever, while musing over the lines, suddenly catch your breath in a little gasp of surprise, while a paraphrase something like this ran through your mind? What would this studio be to me, what would be left of it, how much would it be worth without the children's trade?

Suppose you get out your portrait records and see just what the good will of the children means to you in dollars and cents. The clasp of their warm, little hands, the delightful plays you have with them in your studio, you can't measure these; the currency of the realm has no coin precious enough for such computation. But, keeping strictly within the hard, cold facts of finance, the facts which transform themselves into receipts for rent, light, heat, stock-bills and wages for help,—what do the babies mean to you? Count it up. If they do not furnish something like fifty per cent of your portrait income,—you, the average photographer of

SUNSHINE.

Illustrating article "The Little Autocrats—The Babies," by Jessie Robinson Bisbee.

the average town,—you are not treating either yourself or the babies right.

Our studio has had experience in commercial work with its scores of varied and interesting lines of development; we have filled orders over half of our great state, a state of magnificent distances; we have gone into neighboring states with our commercial outfits at the call of financiers and promoters, and this is our opinion few branches of photography imply a greater need of skill, a more sure road to growth and improvement, and, whisper it, a more steady profit than the simple word—Babies.

Every photographer knows that a happy, healthy baby, for a part of the time, is a near approach to perpetual motion. You may take your choice; catch the motion, or be able to judge that mysterious, heavenly half an instant when baby pauses for a flickering little bit of wondering, a fraction of a second of indecision that makes a playing baby the most adorable thing on earth. "The psychological moment"—ah, yes, and there is no speculation like it. Know the signs, or you fail. And as to when it will come, why the rise in wheat or prospecting for a gold mine are safe, easy things to determine compared with the prophecy of just what a baby will do next.

Only intuition, experience—and the babies—can make a photographer able to grasp this mystical will-o'-the-wisp, this "psychological moment," which, when combined with technical knowledge of the work, gives you the pictures you want of the baby. Make ten thousand negatives of babies and look back over a steady stair of improvement which you have climbed step by step, knowing that real winning the top does guarantee a certain ability which is well worth possessing.

And as for the profit—babies are to the photographer what staple sellers are to the grocer. One does not buy tobasco sauce often, but every day demands flour and sugar. It is something like this with the babies.

Commercial work has its fluctuations, politics affect it, weather affects it, the market affects it, but who ever heard of politics interfering with baby portraits? In all affairs of business, the boom of yesterday means the re-action of today and the depression of tomorrow, and the commercial photog-

THE SPRING OF THE YEAR. CLARENCE E. BISBEE.

rapher feels it deeply (believe me, will you not, for I know), but what sort of a promotion can affect ever so little the desires of a mother when she simply must have portraits made of the sweetest baby in the world?

Oh, you photographer,—you and I, who are the average photographers of the average town—what can we not do with baby portraiture? There is the baby book, for instance. Every mother dotes on it. Look over your studio register. How many babies are there who have never been in any studio but yours? And about their baby books—have you given variety in your negatives? Mark my words, if you have, you have secured good orders. If a mother has money to pay for them, she is not going to overlook the lovely expressions and the characteristic poses when you show baby's proofs.

We charge only a quarter extra for each small negative of a baby; if the style sells for $10 a dozen, for $10.25 two negatives may be chosen; for $11 five negatives will be finished. The quarter is a very little, though it aggregates quite a sum in a year, but it stands for something far more than its tangible value. It insures a respect for one's time and work on the part of the customer and it stands for big orders and for re-orders. The more negatives you finish, the larger the order. Both grandmas must have the full set, of course; unmounted prints from all negatives go into the baby book; another set must be framed in a panel arrangement for the home; then there's enlargements and the numbers of extra prints that are to be used singly. Oh, baby, baby, dear little mascot of our cash-box, how could we do without you? How, indeed?

Then think of the close personal relation to the homes which baby gives you. When the baby is brought in that you, or your wife, or your very clever receptionist may see its birthday Esquimo suit, what an opportunity for friendliness! And, in the small town, unless baby sometimes comes on just such missions to your studio, you have not had all the interest in baby that you naturally should have taken.

Easter comes but once a year with its stylish gowns and bonnets. Commencement with its graduates is one month in twelve, but babies—bless them—need portraits every day

A LITTLE BUILDER.

Illustrating article "The Little Autocrats—The Babies," by Jessie Robinson Bisbee.

the studio is open. The Easter finery is out of date in three months, but the innocence of childhood lives forever. Treasured for generations, the charm of baby portraits never grows old.

The hours spent with children are always well spent. Last year we took time for corn-popping parties in front of our glowing fireplaces; we took time to trim two shining Christmas trees which stood for two weeks before Christmas for every little tot to enjoy. It paid. It paid in the rest it gave us in the holiday rush. It paid in the appreciation of our customers. It paid in good feeling; it added to the general spirit of peace-good-will. And if you insist upon being prosaic and commercial, we'll admit gladly that it paid immensely in December sales.

Each first of January we display pictures of exactly one hundred babies selected from our Christmas sittings. We tried it first just as a pleasing change and the windows attracted so much attention and comment that we established it as an annual custom. I can almost hear some one say, "Do not display many prints; two or three well-chosen ones are better than numbers"; I can see the good points in this argument. But I see, too, the crowds before the windows that held our "hundred baby display." I see again careworn office men stopping to look at every baby's picture. I see again mothers, strangers to us, with their own babies (we've since taken pictures of some of those babies); I see again the groups of merry children; they always like the "hundred baby display." And we like it, too; December must always furnish it for our New Year greeting to a public which is ever indulgent of childhood.

Then there are the occasional Baby Days which we give in the name of the studio and a great company of little guests respond. Laughing babies, frowning babies, smiling babies, fat, roly-poly babies, blue-eyed babies, brown-eyed babies, golden-haired babies, babies with no hair at all, babies in wee, wooly suits, babies in ruffles and lace, babies a-plenty—but not one too many for a successful Baby Day. I should probably add here that we have never been guilty of offering a prize, a very serious mistake in business, we think. What we do for the babies, we do with impartiality; all are treated

A VERANDA PORTRAIT. ARTHUR DARING.

alike; it is a paradoxical situation of each baby being the best?

On such occasions, if the weather is pleasant, there are almost as many baby buggies in front of our studio door as there are in the stock of the big furniture store across the street. The expense of such undertakings we charge up to advertising,—and why shouldn't we? A pleased customer is the best advertisement and surely when you win the friendship of the baby, you have the mother's approval.

It is hard to tell how many indirect orders Baby brings into the studio, but we think so much of the direct orders alone, that half the allowance we made for publicity for the present year, we set resolutely aside for the advertising of our work with children. Dozens of plans with attractive features can easily be worked out by any photographer who has, as a foundation, a real love for the little folks. If they are appropriate and feasible plans, they are sure to be worth the time and money spent upon them, for the returns are far-reaching and the results long remembered.

We've all been children ourselves, so great and small, rich and poor, old and young can join sincerely in the toast: To the little autocrats, beloved the world over—Here's to the babies!

SISTERS. GEORGE STEELE SEYMOUR.

COMPOSITION

By CHARLES ELBERT RHODES

COMPOSITION has to do with the artistic phase of photography. The beginner not only pays little or no attention to it, but he often seems ignorant of the existence of any such thing.

The old "you-press-the-button; we-do-the-rest" idea undoubtedly did much to interest many in amateur photography who would not otherwise have taken up that delightful form of recreation. But, while that idea may be a good thing for camera manufacturers, it is doubtful whether it has done much to make skilled and hence satisfied amateurs, such as have become so much interested as to continue riding the hobby until it is something more than a hobby, until it is a real, substantial, and unfailing source of pleasure.

A poor start is worse than no start at all, for it, all too often, means abandoning photography altogether. Nor is that all. Those who thus give it up are often so discouraged that they never afterward speak of their experience except with disgust, and so keep others from taking photography up at all. The underlying reason for all this is that these deluded quitters early became obsessed with the idea that they could get something for nothing in photography. That idea is wholly wrong there as well as everywhere else.

We admit that snapshot photography has its charms; that there are times when it is the only possible kind. Such charms, however, are not to be compared with those which come to those who use a tripod and carefully study every possible subject to be photographed. Such a study will result in abandoning four out of every five subjects that at first glance, and to the naked eye, looked suitable; it will also mean moving the camera from one to half a dozen times before one is satisfied that he has found the best point of view, the one

Figure 1.
WHICH SHALL I PICK.

from which he can get not a mere record photograph, but a real, artistic picture,—in a word, a picture that has composition.

And what do we mean by composition? Precisely what we mean by the word in the realm of literature: a production that is an interesting and effective, artistic, finished product, possessing unity, coherence, and proportion. If it lacks these it is not a real picture, a finished product, but a mere mass of raw material which may contain the elements of a picture, but no more.

The commonest error which beginners make is in violating the principle of unity: they do not select some one fundamental image and a few major and minor details which go well with it and give it unity and coherence. The way to avoid this error is to give up the idea of taking large pictures (attempting which results only in a record of all that happens to be in front of the camera), and content one's self with a smaller picture with some one definite "point of sight," or fundamental image, and such a small number of details that they can be controlled, by changing the position of the camera, so as to take their proper place in the picture.

Another common error consists in violating the principle of beauty, which is secured by means of proportion. Here, again, the analogy with literary composition holds good. It is fatal to such a composition to have the place of the greatest emphasis, the climax, in the center, for what comes after the climax is what is called anti-climacteric,—worse than useless, positively harmful. And yet the beginner uniformly puts the important part of his picture in the very center of the plate and so spoils his picture.

Never have a sky-line bisect your picture horizontally; have it a third, or two thirds the distance from the bottom of the picture. Never have a path, road, stream, or any such thing, run straight down through the middle of the picture; it destroys its beauty, for it is out of proportion. Have such things at one of the ends, and, at the same time have something else, not so important, at the other end for balance.

The above are the most fundamental principles of photographic composition, and the commonest errors. Let the beginner have the principles in mind as his ideal and guide. Let him also remember the commonest ways of violating those principles,—it will serve as a danger signal.

The accompanying illustrative pictures are examples of what has been said. Figure 1, "Which shall I pick," has the fundamental image, the girl, at the right of the picture. The eye naturally rests upon her. One naturally asks what she is doing. The answer is most evident: she is selecting a flower to pick. The bush gives sufficient balance, while the houses furnish a suitable background.

Figure 2, "The Forest Road," illustrates the principle of composition by having the road at the left of the picture and having it balanced by the dense trees at the right, as well as by having the dense trees balanced by the clear sky in the upper left corner.

A word of caution in closing: Do not throw away your negatives because they lack composition as a whole. Cut away the parts that do not make a good picture; or, better still, select some part that does have good composition and discard the rest. Your picture may be small; but it will be at least a picture. Then, too, there is such a thing as enlarging.

Figure 2

THE FOREST ROAD.

Figure 3.

PHOTOGRAPHING BIRDS AND MAMMALS FOR SCIENTIFIC ILLUSTRATIONS

By TRACY I. STORER

HERETOFORE photographs of birds and mammals have been of two kinds: the living animals, and of dead specimens, the latter chiefly of the larger game animals and usually unarranged. For use in illustrative and teaching work, and for the assistance of taxidermists a third type is desirable, namely, photographs of freshly killed specimens carefully arranged to show the structural features by which the species can be recognized. Such photographs are much more satisfactory for illustrations in handbooks and manuals than the usual pictures of formal museum specimens.

For the production of such pictures it is necessary to have dead specimens in good condition, with as little mutilation as possible, from trap or shot. The apparatus necessary for the work is as follows:

1. A camera equipped for ground glass focusing, and with a bellows extension sufficient to photograph objects nat-

I DO BELIEVE IN FAIRIES. *Copyright, 1915, by Edward Henry Weston.*

Figure 1.

ural size. Maximum distance from lens diaphragm to plate twice equivalent focus of lens used.

2. A support enabling the camera to be directed vertically downward on the object. A stout tripod and *rigid* tilting top (such as the Crown) make a satisfactory combination.
3. A sheet of glass, ground on one side, and of sufficient size to support the object.
4. A reflector of white cardboard or blotter, to place below the ground glass.
5. A scale (ruler) showing millimeters or inches, or both.
6. A ray filter.

The apparatus is assembled as shown in Figure 1, the same arrangement being used for either indoor or field work. The support for the ground-glass (in the illustration the camera case filled with books was used) must be firm enough to hold the object perfectly steady during exposure, and far enough to one side so as not to cast a shadow on the white reflector where it appears below the object. Before putting the specimen in position the glass should be lightly oiled to increase its transparency. Three-in-one oil or vaseline may be used.

Bird specimens should have all feathers overlapping one another in proper order. For side views the head of the bird should be slightly raised and supported from beneath so that it will be in line with the main axis of the body. The position of the bird will depend upon the structures or markings which it is desired to show. With mammals the hair should be carefully smoothed out. In side view, especially in the case of the larger species, the feet farthest away should have their lower surfaces turned slightly toward the camera so that the pads will show. In a back view the legs and feet of a mammal should be arranged symmetrically and parallel to the head and tail. In adjusting either feathers or hair a slender stick will be found useful.

If the specimen to be photographed is too large for the ground glass it may be laid on a piece of white sheet cotton, under which some white cloth or paper has been laid. This will give a background almost as white as that formed by the ground glass, yet devoid of sharp shadows such as would occur if a hard opaque background were used.

When the subject has been properly arranged a scale should be laid on the background or ground glass so as to be included in the picture. It should be parallel to the body of the animal and with the zero end even with the tip of the nose or bill of the specimen (Figure 2). This will obviate the necessity of calculating and keeping a record of the magnification or reduction for each exposure.

When working out of doors it will be found that air currents sometimes cause movement in the subject sufficient to blur the image. If this happens, a wind shelter must be erected about the apparatus, but distant enough so as not to cause shadows or unequal lighting of the subject or background. A diffused light and not direct sunlight should be used for lighting the subject during exposure. A light tent will be found very helpful as a shield from both sunlight and wind should these two elements cause difficulty. Exposures of five or six minutes duration, such as Autochromes often require, have been successfully made in a small, lightweight canvas tent.

To obtain good gradations in tones and colors, a double-coated orthochromatic plate should be used in combination with a ray filter. Excellent results have been obtained by the author with Seed's Non-halation L Ortho Plate and Wratten and Wainwright's K_2 Filter.

Exposure must be determined as accurately as possible in this work, and the use of an actinometer is strongly advised. Also the camera extension must be carefully taken into account in calculating the exposure. Having determined the necessary exposure for a normal subject for the plate and stop in use, this time must be multiplied by the factor for the ray filter and also by the result obtained by dividing the square of the camera extension (distance from center of lens to plate) by the square of the equivalent focus of the lens.

Development and printing may be carried on by any favorite method. The essential point is to produce a snappy print, with good detail and contrast and with the background but slightly tinted. Tank development with pyro and printing on a glossy developing out paper, afterward squeegeeing the prints on ferrotype plates, has been found to give excellent results (see Figures 2 and 3).

The method here outlined for photographing birds and mammals may of course with modifications be applied to the photography of almost any object of natural history.

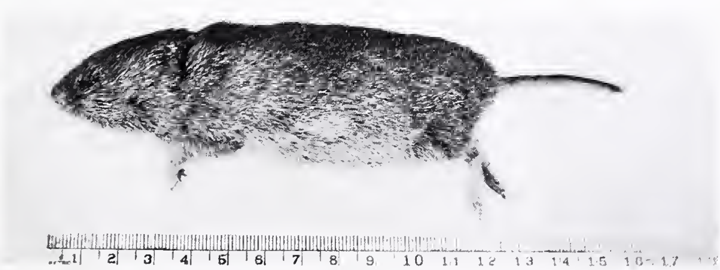


Figure 2.

Figure 3.
A FINE BUCK ON A MIDNIGHT RAMBLE.

HIGH SPEED FLASHLIGHT PHOTOGRAPHY

By WILLIAM NESBIT

THE usual manner of taking pictures by flashlight is to turn out any artificial lights which may be near at hand, so that the subject to be photographed will appear dark. This permits of opening up or uncapping the lens immediately prior to the flash and closing it immediately after the flash. Under these conditions practically all the light received by the plate would be that provided by the flashlight, the other light received between the time the lens was opened and the flash started, also between the end of the flash and the closing of the lens, being usually so weak as to have practically no effect upon the plate.

The opening and closing of the lens may be made automatically by any one of various methods so as to minimize the length of time the plate is exposed prior to and immediately following the flash. It is particularly important to

A WINTER FOOT-PATH. WM. LUDLUM, JR.

reduce this time to a minimum in cases where the subject to be photographed cannot be darkened, for instance, in the case of photographing a walking person on the street on a very cloudy day, or late evening, when the light is too poor for ordinary snapshots without the aid of a flash. In such a case, the light reaching the plate just prior to and immediately following the flash would probably be sufficient to make an impression on the plate, causing a blurring of the image.

By employing one of the various schemes for automatically opening and closing the lens, the total time of exposure of the plate may be reduced to 1/5 of a second. In this case, if the flash lasted for 1/10 of a second, the remaining 1/10 of a second represents the total time the plate would be exposed to the natural or artificial lighting of the subject. Even this short time might cause a blurring of the image if the subject is fairly well lighted. It would be desirable in such cases to employ some method of so-called "high speed flashlight" photography, in which the plate will not be exposed except during only a portion of the duration of the flash.

In the case of taking flashlight pictures in a room which is or may be darkened, as at night when there is no objection to having the plate exposed for a short time immediately preceding and following the flash, a speed not exceeding 1/25 of a second may be obtained with good results. As this is the maximum practical speed of flash powders, higher speeds can only be obtained by employing the shutter in connection with some method which will cause it to expose the plate during only a portion of the flash. In taking portraits in places which may if desired be darkened, there is one advantage in using a high speed method, even though a speed of 1/25 of a second is sufficient for this service. The advantage in such cases is that the subject need not be darkened. This may cause less tendency to stare, due to the sudden increase of light from darkness to the intense light of the flash. Another advantage is that slower speed flash powders may not only be employed but are desirable, thus resulting in slightly less noise.

The advantages of high speed flashlight photography are very numerous, and at present little appreciated. This field is just opening up and will be more widely used in the not distant future. Its general use has been retarded owing to two reasons. One reason is its more or less complicated nature, and the other the unreliability of apparatus in the past for this service. Unfortunately (for the early development of this field) the apparatus which has been made for high speed service has all had one fundamental defect. That is, they are all based upon a definite time elapsing between a certain operation and the instant of maximum illumination of the flash. In other words, the shutter is tripped after a definite time following some other operation, regardless whether or

Figure 1.

not the flash has reached its maximum value at this instant. Adjustments are provided so that this time may be varied at will. This would give satisfactory results provided the flash also reached its maximum value at a definite time after a certain operation. In this case, they could be adjusted to go together. Unfortunately, however, various flashes (even of powder taken from the same box) do not reach their maximum value at the same time as indicated by the illustration. (Figure 1.) The result is that with these methods the shutter cannot be depended upon to open at the instant of maximum illumination, or, preferably, just preceding this instant, but is liable to expose the plate during a portion of the flash when the instantaneous value of light is low or even before the flash has started or after it has passed. With such methods the shutter exposes the plate after a fixed time regardless of whether the flash has been tardy or fast in reaching its greatest illumination.

When I speak of a variation in time required for the powder to reach its maximum illumination, I am speaking in small fractions of a second. We will assume the powder used has a speed of 1/10 of a second and that adjustment is made so that the shutter should expose the plate during the middle portion of the flash. In such a case, should the powder lag or lead in igniting by 1/20 part of a second, the shutter would expose the plate at the start or end of the flash, resulting in failure.

If flash powder having a higher speed than 1/10 of a second were used, the results with such methods would be still more disastrous. It will be apparent from the above how a slight variation in the time of ignition will cause a complete failure. This variation of 1/20 of a second is very common in practice and is due to different compositions of powder, to different degrees of moisture in the powder itself, and in the atmosphere. It is also due to methods of ignition which vary. especially in the case of electrically fired lamps.

The method which will be described below has been developed in order to overcome the above mentioned defect. This method simply consists in utilizing a portion of the energy liberated by the exploding powder to trip the shutter. In other words, the shutter is not tripped until after the powder is actually ignited so that there is no possibility of the shutter opening too soon. With this method, it does not matter how slow or how fast the powder is in igniting. The lamps described below employ this principle for operation, although the tripping methods vary in form.

TYPE "A" (Cartridge fired lamp)

This is a moisture proof lamp developed for use in the case of wild animals taking their own pictures by flash light. Such lamps may be set out of doors for long periods of time and consequently must be moisture proof. It is shown in perspective (Figure 2). It consists of an aluminum casting, a tube having its upper end enlarged to receive the powder box

ONE OF THE MOVIES. **Louis Fleckenstein.**

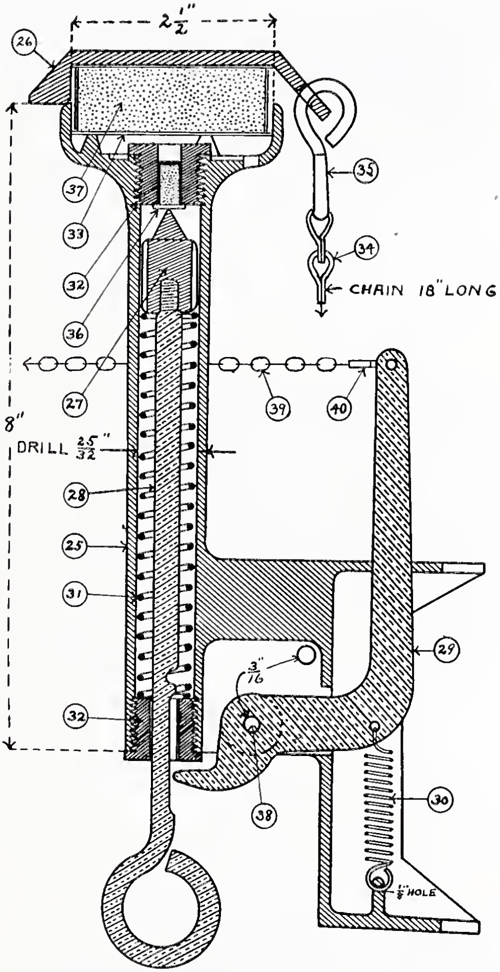


Figure 2.
VERTICAL SECTION THROUGH TYPE A LAMP.

(33), and a side extension at its lower end terminating in four feet. To the upper end of the brass plunger-rod (28) is screwed a case-hardened iron firing plunger (27), which is driven vertically by the bronze compression spring (31) striking and exploding the copper cap in blank cartridge (36). Two case-hardened iron screw nuts (32) close up the two ends of the plunger chamber. When the brass rod is pulled downward, compressing spring (31), the brass trigger (29) automatically engages the slot in the brass rod due to the action of the bronze extension spring (30). An aluminum cap (26) fits snugly over powder box (33), thus protecting it against the direct action of rain, and in addition furnishing a means for tripping the shutter. A strong non-corrosive sash chain (34) 18 in. long secures this cap to a lug on the lamp casting. The explosion of the powder blows the cap in the air until the chain becomes taut, when it falls back by gravity. The instant the cap starts on its upward journey a

Figure 4.

small aluminum prop is pulled from under the finger release of the camera shutter and a small bronze extension spring attached to the finger release trips the shutter, exposing the plate at the instant of maximum illumination.

The lamp is secured to the side of a tree just behind and above the camera. From the trigger a small brass wire is carried across an animal runway in such a manner that a walking animal walking against the wire pulls the trigger and fires the lamp (Figure 7). In the case of baiting the bait is secured to the end of the tripping wire and the animal pulling on the bait fires the flash. (Figure 4.)

After the paper box has been filled with powder, it is made

FIRST PICTURE. Figure 6.

SECOND PICTURE. Figure 7.

The flash which took this picture was automatically fired one second after the first flash which took the picture in Figure 6.

Illustrating article "High Speed Flashlight Photography," by William Nesbit.

moisture proof by dipping it in melted paraffine. The powder box holds two-thirds of an ounce of powder.

In the case of animals pulling at a bait, a shutter speed of 1/100 of a second is employed to stop motion, but in the case of walking animals 1/200 of a second is necessary. This data is based upon a lens speed of F/8 and distance of animals from lens from 8 to 12 feet.

These flashes are very powerful, partly on account of a large charge of powder being required for such high shutter speeds, and partly because the powder is confined in a paper box. The charge may be heard for a distance of a mile or two in the woods under favorable atmospheric conditions and under similar conditions the reflection of their lights has been seen for a distance of five miles.

In the fall of the year when the ground is covered with dry leaves, it is advisable to either burn or brush away these leaves for a radius of ten (10) feet from the lamp. This will guard against a forest fire being started by burning fragments from the flash. There is sufficient dew at night to prevent a fire starting from the flash, but should the flash be fired during the day, at a time the leaves are very dry, there would be a remote possibility of a fire being started. A danger sign is placed under the lamp to warn intruders to keep away.

TYPE "G" LAMP STAND

This is a double flash stand mounted upon a tripod (Figure 5). It is used for the purpose of obtaining automatically two flashlight pictures of the same animal one second apart. The animal pulling on the tripping wire fires the first flash as usual. The heat from this flash fuses a small copper wire or a string which holds a weight suspended in the air. The fusing of this wire causes the weight to fall by gravity. This falling weight being connected to a second firing switch closes the battery circuit through the fuses in a second powder box, thus firing a second flash. The second flash operates a second camera in the usual manner. The second flash picture shows the animal in a frightened condition (Figures 6 and 7). The time between these two flashes may be varied by causing the weight to fall a greater or less distance, the longer the fall the greater this time.

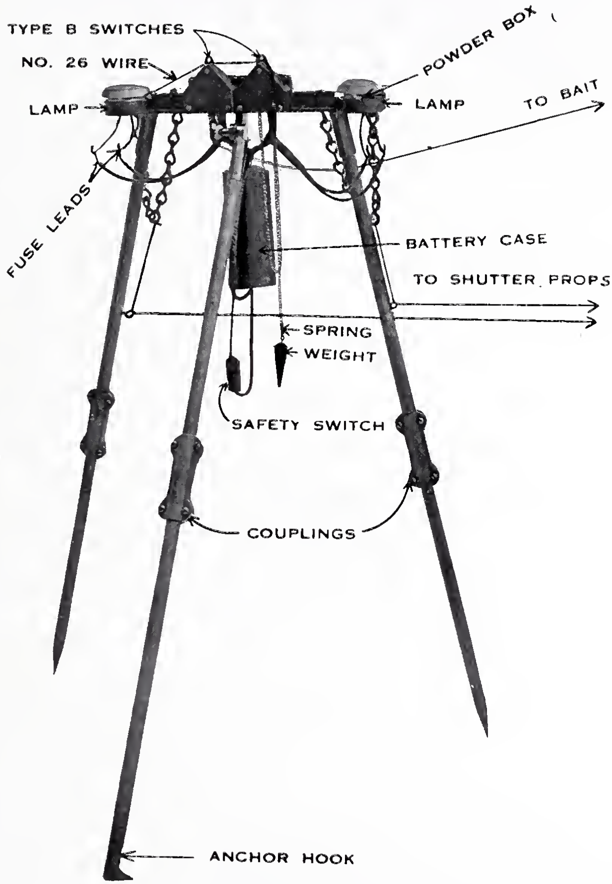


Figure 5.

TYPE G RAIN- AND MOISTURE-PROOF ELECTRIC-FIRED DOUBLE-FLASH STAND CONSISTING OF TWO LAMPS. FOR USE IN TAKING AUTOMATICALLY TWO FLASHLIGHT PICTURES ONE SECOND APART.

Although ordinary cameras may be used for this service by protecting them from rain, they are not moisture proof and plates will usually not keep in good condition over twenty-four hours in them, especially the higher speed plates.

A moisture proof camera has been developed for this service in which plates will keep in good condition for long periods of rainy weather. (Figure 8.) These cameras are of cast aluminum 3/32 of an inch in thickness, except at their back end, where they are 3/16 in. thick in order to provide greater mechanical strength required at this point. Although 3/32 of an inch is too thin to cast with any assurance that the rapid chilling of the metal will not cause flaws, thus spoiling the casting, this thickness has been insisted upon in order to reduce the weight to a minimum. About one-half of the castings are lost as a result, but the reduction in weight probably makes it worth the increased expense for castings. They have been designed to be used in connection with 4 x 5 Graflex plate holders, which enter the camera through a slot on the right-hand side. After the plate holder is placed in the camera and forced forward into position by a wedge placed back of it the aluminum cap is forced against the rubber gasket by turning on the brass hand-screw. A removable lens ring, 3/16 of an inch wide, accommodates the lens to either 8 or 12 feet focus. With the ring in use the focus is 8 feet, and with the ring not in use the focus becomes 12 feet. For small animals 8 feet, and for large animals 12 feet is very satisfactory.

The cast aluminum legs are 25 inches long and are attached to the 3 lugs on the camera with brass wing nuts.

The camera weighs complete with legs 9 lbs., and has overall dimensions of 11¼ in. long, 8⅞ in. high, and 9 in. wide.

Between the heavy brass lens board and the camera front is placed a heavy rubber gasket. Between the lens elements and their mounting are thin rubber gaskets and on the lens threads and the shutter threads is placed a little vaseline so as to prevent any possibility of moisture entering at these points. Within the dark chamber may be placed a small black bag of calcium chloride to absorb any moisture in the air at the time the camera is closed up.

For photographing deer, moose and other animals standing in the water and along the shores, lakes, an outfit has been designed. This is placed in the bow of the boat. It consists of a horizontal revolving bed upon which one or more cameras are secured by tripod screws. This bed supports a vertical hickory rod upon which one or more of the lamps may be mounted. The jack lantern (used for locating deer, etc.) may be also supported by this rod. The bed, cameras, jack and flash lamps are all supported by a ball bearing pedestal. This pedestal may, if desired, be screwed to the seat in the bow of the boat. The advantages of such an outfit are as follows: The ball bearing permits of noiselessly turning the jack lantern through an angle of 180 degrees for the purpose of locating animals. Without a turntable it would be necessary to turn the boat so that the cameras pointed to the animals when the flash is fired, and any noise in turning the boat or disturbance in the water might frighten the animal. With this outfit when the jack shines on the animal the flash may be fired (provided the distance is right) for the cameras moving with the jack light are always pointed right. Since the cameras do not move relative to the flash lamp these turntables permit of using the shutter prop method, for tripping the shutter.

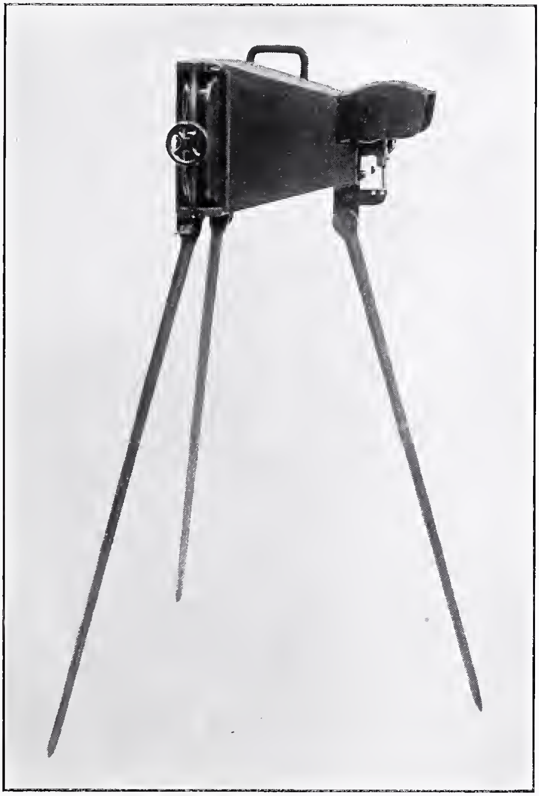
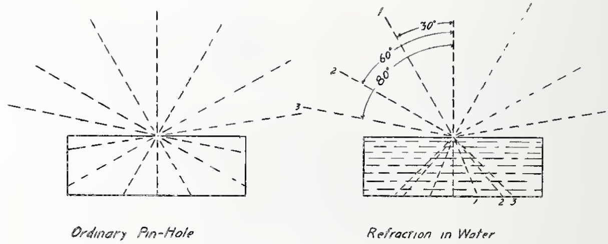


Figure 8.
MOISTURE-PROOF CAMERA BUILT ENTIRELY OF ALUMINUM.



Angle of Incidence	0°	30°	60°	70°
Angle of Refraction	0°	22°	40°18'	44°36'

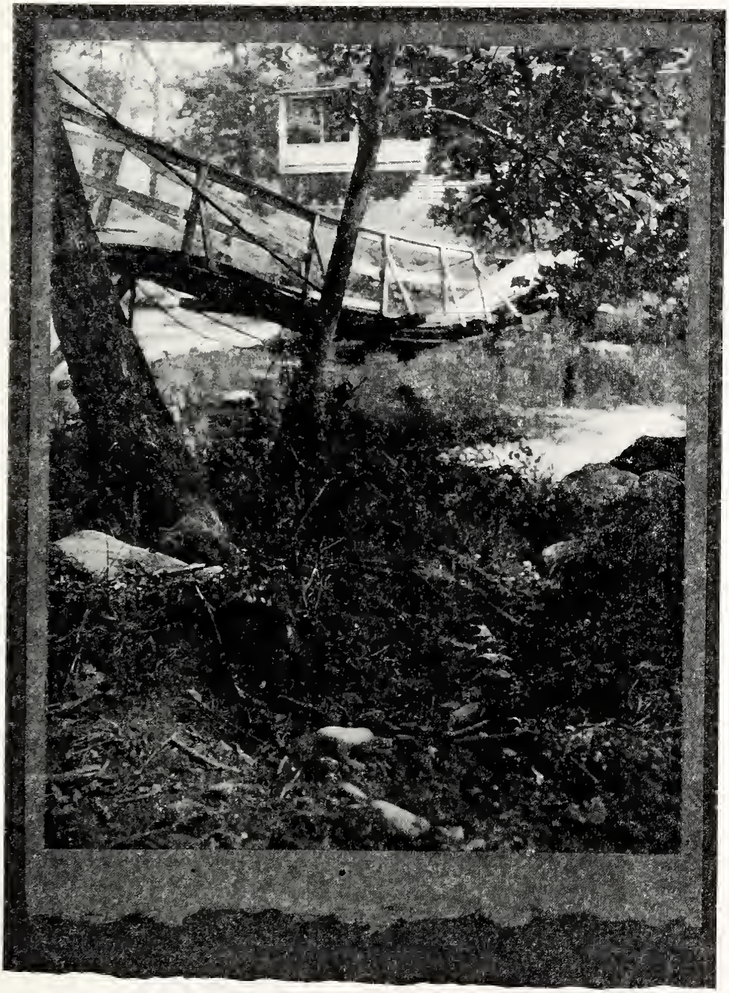
Figure 1.

SEEING 180° WITH A CAMERA

By LUKE R. VICARS

WHEN light passes from air through some other transparent media it is bent from its original path, or refracted, the amount it is refracted depending upon the index of refraction of the media in question. If rays of light are allowed to pass through a pin-hole which is on the surface of water (as a box with a hole in the top filled completely with water), the rays of light instead of going on their original paths will be refracted thus crowding the whole horizon into a circle the radius of which will depend upon the distance the screen is placed back of the pin-hole. Figure 1 will illustrate this.

An apparatus constructed on this principle for photography



THE BROKEN BRIDGE. G. W. Harting.

has been invented by Dr. R. W. Wood. Since it photographs objects as a fish sees them Dr. Wood has called it a "Fish Eye Camera." (Figure 2.) It has been my privilege to make a series of negatives with this camera. I hope a few notes of my work may induce some of the readers of the "*American Annual*" to take up this very interesting experimental work.

The camera proper consists of a brass box and a special pin-hole for objective. A lens was first used, but one could not be obtained fully corrected for the extreme marginal rays. The drawing was made from the original camera which takes

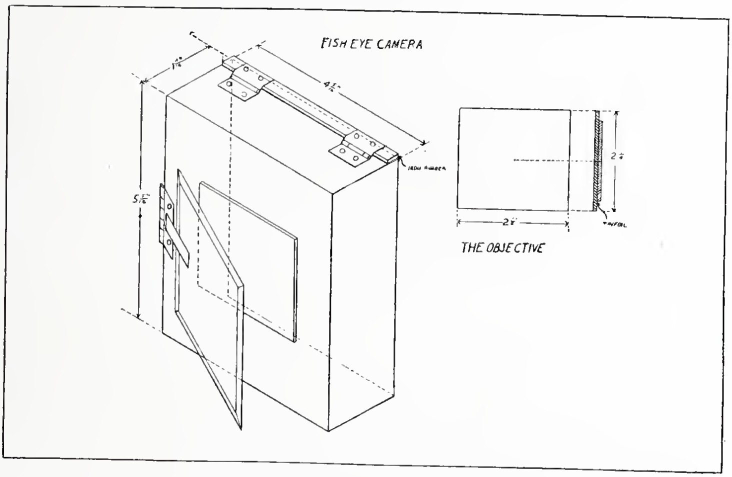


Figure 2.

a 4x5 plate. The box is made of medium gauge sheet brass. The depth gives a focal length of about one and one-half inches, this depth being calculated to crowd the horizon into a circle or a four inch diameter. The back is first cut out, then the sides soldered on, first soldering grooves in the two longer sides for the plate to slide in. A slit in one of the shorter sides is made so a plate may be slipped into the grooves.

We shall now call this the top. The front of the box is then cut out. This has a hole 2x1¾" exactly in the middle. The slit in the top is covered by a lid closing on a piece of rubber to make the box water-tight. The objective is made by cementing a piece of thick tin-foil 2½x2¼" with a fine pin-hole in the centre between two plates of glass. The upper plate is cut 2½x¼" and the lower one 2x1¾", thus forming a shoulder to cement the top plate to the "camera" front and allowing the lower plate to come inside. Canada Balsam is used to stick the tin-foil to the glass plates. A small quantity is placed on each plate, the plates are now heated until the Balsam runs over them, the tin-foil with the pin-hole in it is carefully laid on the larger plate, than the smaller plate is laid on this and the whole pressed firmly together and set aside to cool. The pin-hole is best made by piercing the tin-foil with a red hot needle. If simply punctured then the hole will close when pressed between the glass plates. The function of the lower plate is to prevent any air-bubbles that might be in the water from getting under the pin-hole. The completed objective is cemented in the hole made for it in the front of the box, with sealing wax.

We now have a complete "Fish Eye Camera." To operate it, first fill the "camera" completely full of clean water; then in the dark-room lower a photographic plate into the grooves. This should be done slowly to prevent air bubbles. The lid is hooked down and the pin-hole covered. It is now ready for an exposure. The camera is close to the subject. A picture of a row of men in front of a building was taken at a distance of six feet from the centre man. The top of the tripod showed at the bottom of the picture, demonstrating that the camera embraced an angle of 180°. The camera may also be used on its back when the whole horizon will be included.

The exposure was about two and one-half minutes with good winter sunlight with the writer's camera. The plates the writer used were Stanley. Two hours soaking does not seem to do any harm except to make them a little slower. I think the drawing (Figure 2) will make the general construction clear.

THE COPPER BOWL. L. M. A. ROY.

CONTROL IN BROMIDE PRINTING

By A. T. LAKIN, M.D.

IN one form or another, "control" has always been with us, and in the Oil and Bromoil Processes the modern Photographer claims an amount of Control that no other process can give. The object of this article is to show the great amount of control one can obtain with the Bromide Process.

In controlling a print, the first thing to be done is to definitely decide upon the effect that is desired. Thus, Are the gradations of the print to be altered in their entirety? Do we wish to increase the pictorial value of any portion of the print? What is the pictorial idea that we desire our final print to convey? Having decided upon this, there must be no change of mind in the midst of the operations. They should be carried right through, and then when the print is dry we can debate whether our opinion was right or wrong.

A favorite method of mine for the alteration of the gradations of the print is as follows: I estimate the exposure by the eye alone, erring on the side of over-exposure, the print is soaked in water, and then this developer is poured on:

A.—Adurol		3 drams
	Sodium Sulphite	3 ounces
	Water	19 ounces
B.—Potassium Carbonate		2¼ ounces
	Water	19 ounces

Equal parts of A, B, and Water are taken, and to each ounce of developer, one dram of a ten per cent solution of Potassium Bromide is added. The print is developed with this, until the shadows are as dense as I desire, (judge the density by looking through the print, not on its surface). When this stage is reached, the developer is poured off and the print flooded with water for the purpose of careful examination.

Sometimes this treatment is sufficient, but if the details in

PORTRAIT STUDY. MYLES STANDISH WARFIELD.

the shadows are not developed as far as I wish, I apply a fresh developer of ten drops of rodinal to four ounces of water, and leave the print in this until the shadow details attain the strength I wish. In this way I can get any desired effect from light to dark, from a flat print to one with strong contrasts, the exposure being of no great account, providing one does not get extremes of under or over-exposure. Under-exposure simply requires a longer development; over-exposure, a shorter one.

The final color of the print is the only possible cause for complaint, and this can be easily remedied by after processes. The print is now fixed, washed, and dried, and we may now find there are still some points that require attention. The

Figure 3.
SAME AS NO. 2 BUT CHROMIUM BLEACH REPEATED, THEN RE-DEVELOPED RODINAL.

color of the print is not pleasing, the print is flat, and lacks lustre. The remedy is Re-development.

Bleach the print in this solution:—

Potassium Bichromate	90 grains
Sulphuric Acid	250 drops
Sodium Chloride	1 ounce
Water to	10 ounces

Wash free from Bichromate, and re-develop in full daylight with an Amidol Developer free from Bromide. This is my favorite:—

Amidol	25 grains
Sodium Sulphite	240 grains
Water to	10 ounces

Figure 1.

ORIGINAL PRINT.

Figure 2.

POT. BICHROMATE BLEACH—RE-DEVELOPED AMIDOL—CHROMIUM BLEACH—RE-DEVELOPED RODINAL.

Illustrating article "Control in Bromide Printing," by A. T. Lakin, M.D.

This gives a fine Platinum Black Tone, and a jolly fine Sepia, if we use Sodium Sulphide as the re-developer.

Another bleacher that will give Black Tones with the above Amidol Developer is

Potassium Bichromate	100 grains
Hydrochloric Acid (dilute).......	200 grains
Water to	10 ounces

If we make this up as a stock solution with the amount of Hydrochloric Acid reduced to 100 drops, this acts as a Chromium Intensifier, of which I shall deal shortly; then by adding 10 drops to each ounce, we make the above bleacher.

The distance and middle distance do not recede enough.

Bleach the whole print in a Ferricyanide and Bromide bleacher, wash, re-develop the foreground with any bromide developer, apply with a brush, and develop it to its full extent, and then wash, and flow over the print a weak Rodinal solution, 1 in 180, watch it carefully, and as soon as the distance is developed far enough, wash, fix, wash and dry.

Local intensification.

This is easily done. Bleach out the part that it is desired to intensify, with the chromium intensifier, wash well, and re-develop, repeat if the intensification is not sufficient, and finally re-develop the whole print as in Method 1.

This can be applied in many ways, and one can control in this manner any part of the print; illustrations are given of the practical applications of this method.

QUEENSBORO BRIDGE.

T. W. KILMER.

FINISHING THE EXHIBITION PICTURE

By GEORGE C. CASSIDY

IT is a strange thing that quite a number of good workers will spend many an hour over a good picture until they secure a print to their satisfaction. They then seem to think that their task is done, the mounting is hurried over and the picture sent to the frame maker to have a frame fitted. The best Photograph in the world may be ruined by unsuitable mounting and framing.

To many quite excellent workers the print is the thing, in fact some seem to take a pride in showing how careless they can be with the mounting and framing. The print is trimmed and stuck on a piece of mounting board which "will do" and use one of the commonest of frames which they happen to have beside them at the time.

There is more in the mount and frame than most people imagine. Indeed the perfect frame should not do other than unconsciously lead the eye to the beauty of the picture. This quality in mount and frame is impossible unless thought is given to each individual case, and the best of material must be used and no jarring note due to bad workmanship.

Harmony is what should always be aimed at both as regard color and size. A very bold subject is often best framed close up and a heavy frame used, but only when the picture is of large dimensions. A picture of delicate tone is best mounted on a large light-toned mount allowing a good margin all round and framed with a narrow moulding, the color of the frame being about the same as the most predominant tone in the picture. A vertical picture adds dignity to the subject and a horizontal one tends to give the impression of peace and rest. A photograph of a hilltop scene if mounted near the top of a vertical mount gives a good effect of loftiness.

We are glad that the day of the heavy oak frames is about gone, that the day of the dark mount and frame is fast dis-

WASHINGTON MONUMENT AT NIGHT.
ILLUMINATED BY SEARCH LIGHT.

E. L. CRANDALL.

appearing, and that the elaborate multiple mounting is dying out also.

The modern tendency is to use simple mounts of one or two tints of a light hue. One has only to look around some of the leading exhibitions to see how popular the light mount and the narrow frame has become. For Black and White prints a light tone of Grey with one or two lines round the print are very effective. The lines are put on with an ordinary drawing pen using water color as sold in tubes. The framing seems to be the greatest difficulty with most photographers. It becomes a little expensive to send each picture to have a special frame made. To those readers who have tried

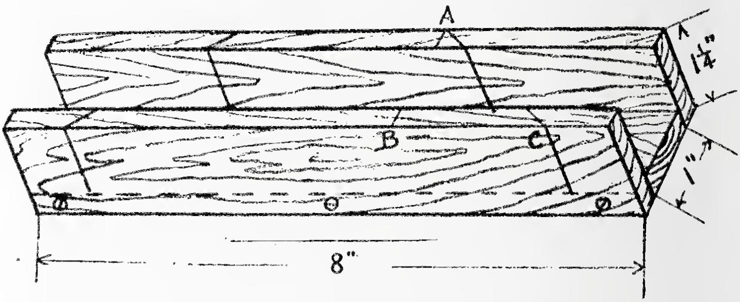


Figure 1.

their hand at picture framing and given up in despair owing to bad miters, split mouldings, and the many other little things which the amateur frame maker runs up against the following instructions and diagrams may be useful, and the cost is very little. The tools required are few in number—a small tenon saw, some small pieces of wood, a piece of cord, and glue. The first thing wanted is a miter box (Figure 1) which may be constructed from almost any kind of wood, but take a little patience with it and make it exact. The sizes are—Bottom, 8 inches long by 1 inch broad by ⅜ or ½ inch thick. The sides are fixed to the bottom by three screws about 1 inch long. The most important part about the miter box is the cuts or guides for the saw. These, however, can be fixed very exact and with very little trouble. Fix a mark at "A" (Figure 1) 2½ inches from the end, then with a set square square it across, make a mark at "B." The distance from

THE WHITE HOUSE. T. JACKSON.

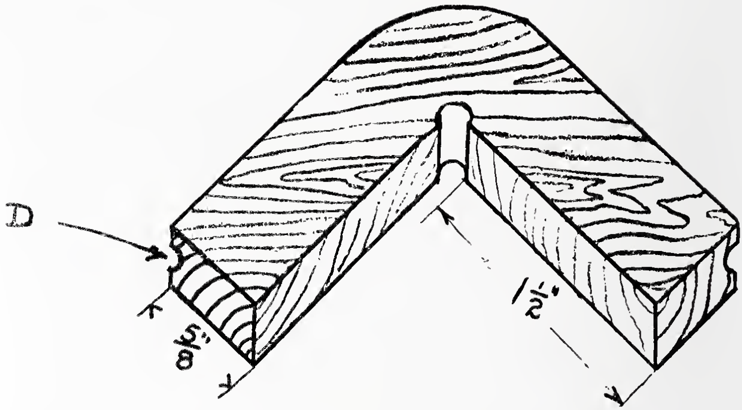


Figure 2.

"A" to "B" should be 1¾ inches; now from "B" measure 1¾ inches towards the end and mark "C." Take the saw which you intend using to cut your moulding and saw right down the lines "A" "C" until you touch the bottom. This should give you an exact miter of 45 degrees. Repeat the operation at the other end and your miter box is now ready for use; the distances from A to B and from B to C should be equal.

The chief difficulty which the frame maker finds is the cramping of the corners. Expensive cramps can be bought but the kind illustrated in Figure 2 are what I have used for many years and are quite simple to make. The four corners can be cut out of a piece of wood as shown in Figure 3, a

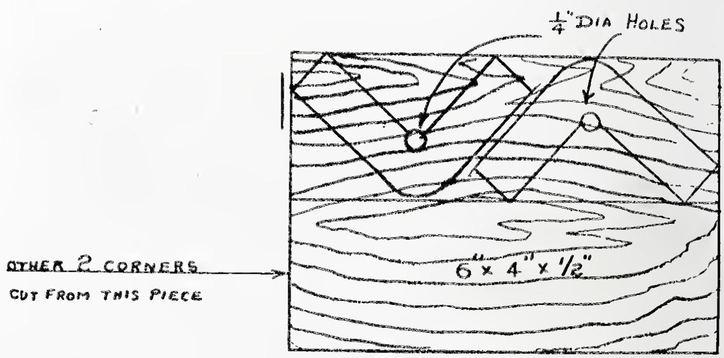


Figure 3.

¼ inch diameter hole bored at the corners, and then sawing right into the hole along both lines the inner part drops out, then cut the outer lines with a saw and round the corners with a chisel. A groove should then be cut round the outside with a gouge (or red-hot iron) as shown at D (Figure 2) to receive the cord when cramping. Next get a piece of stout cord (window-blind cord answers the purpose very well) and a small wooden hand screw and we are fully equipped for

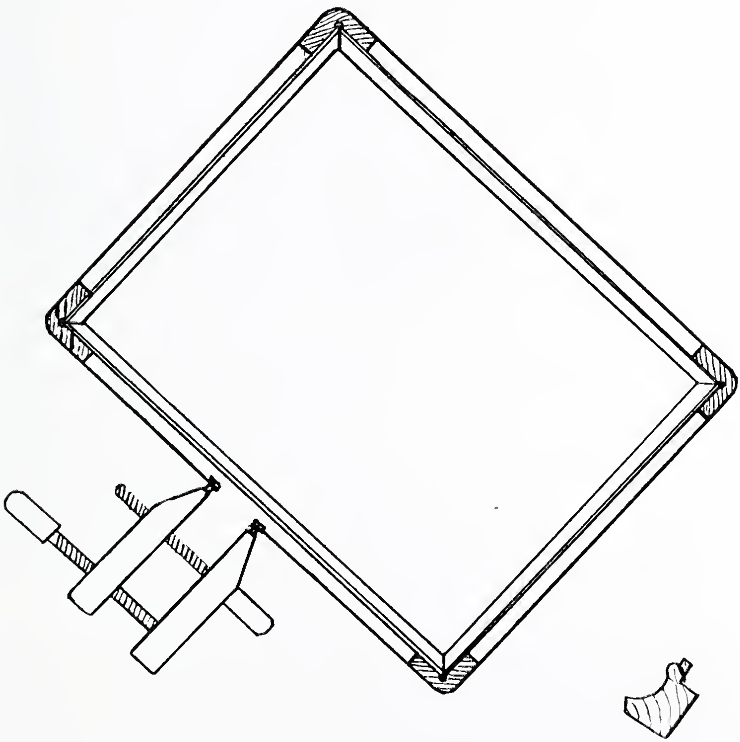
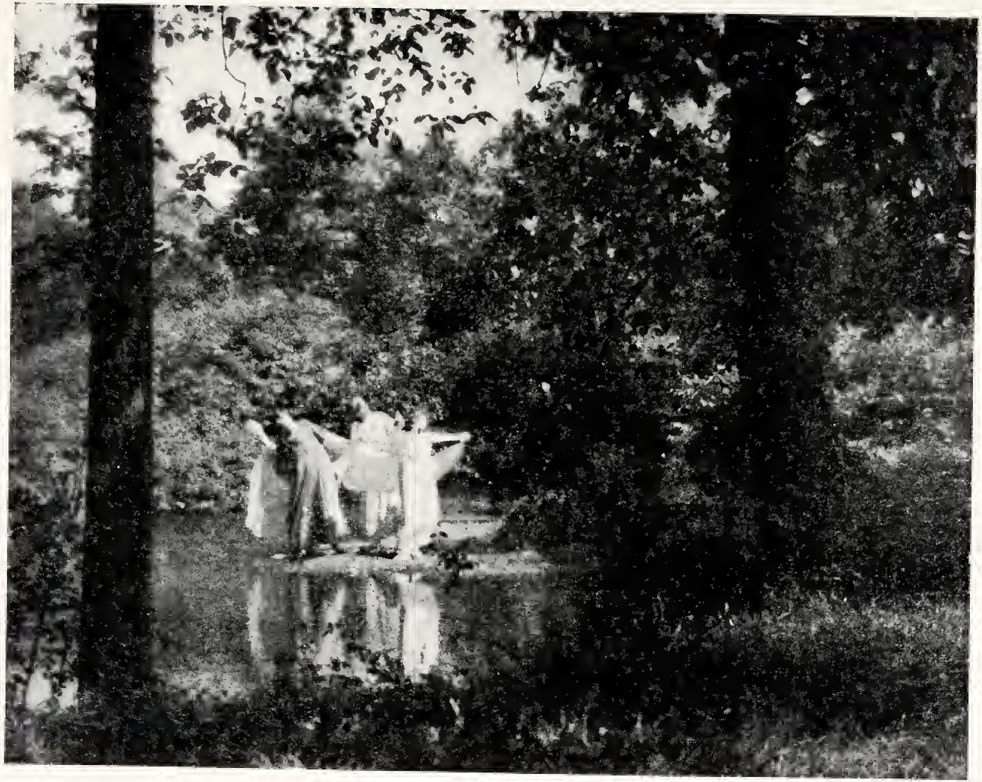


Figure 4.

making any number of frames. The moulding which I use is about ½ or ¾ inch broad and costs about one cent per linear foot either in oak or pine and can be purchased at almost any sawmill in lengths of about 10 feet. To cut the miter place one end of the moulding in the box, the outside of the moulding against the side of the box and the back of the moulding on the bottom. Place your saw in the cuts, then saw right down until the saw touches the bottom of the box. The glass size should then be measured along the rabbet of the moulding and the other end cut. Having all the pieces cut, if the saw has been in good order there will be no need for smoothing the ends, as the slight roughness gives a good tooth for the glue. Place the pieces in position on the table, place the corner blocks and pass the cord round them, make a loop at either end, leaving a gap of about 4 inches to allow

LANDING THE CATCH, YORKSHIRE COAST. CHAS. E. WANLESS.

for tightening; the two loops are placed over the heads of the two screw nails which have been fixed in the ends of the wooden hand screw. We are now ready for gluing up. Lift out each piece and touch the miters with some good warm glue. When all the pieces are glued put them in position again and tighten up the cord by screwing in the jaws of the hand screw (Figure 4). The frame may now be left over night to harden. It is not advisable to nail such small mouldings; my plan is to put a saw cut at the corners (after the glue is hard) and slip in a thin piece of wood with a touch of glue and clean it off with either chisel of penknife (Figure



John Wallace Gillies.

5). We now have our frame complete and it can be polished or stained according to taste. Some people have told me that you can buy frames as cheap as you can make them. I doubt it. A frame measuring 12″ x 15″ to suit a whole plate print cost me about six cents without glass, and there is the additional advantage that you can make the frame to suit the picture instead of the picture to suit the frame as appears to be the case with some exhibitors.

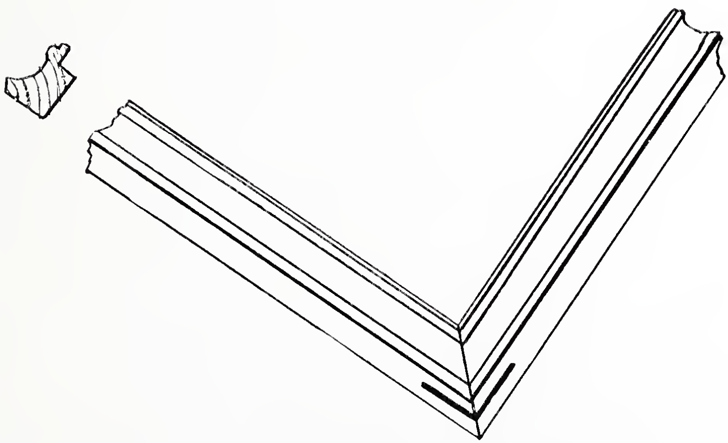


Figure 5.

HOW CAN HALATION BE CONTROLLED?

By ROGER B. WHITMAN

IT is an odd trait in human nature to accept without second thought any of the developments of science, but nevertheless to fret and fume if a detail lacks in perfection; thus we take for granted the marvel of the telephone, the systematic complexity of its switchboard and the wonderful organization that is at our service, and start shaking the receiver hook if Central is ten seconds late in giving us a connection.

We do unreasonable things of this sort all day long; but it must be admitted that if we acted otherwise our progress toward perfection would be slow and halting. Thus it is that I am putting to one side the marvel of photography itself, our mastery of orthochromatics, of color reproduction, of speed work, and make complaint of our troubles with halation.

Unquestionably it is our bête noir. What joy it would be to blaze away at an interior with the knowledge that the edges of a window would come clear and sharp with a fully detailed landscape showing beyond, and all gradation true to the subject! It is admitted that halation is under better control now than it used to be, but none the less it is not yet possible to photograph a subject containing extreme contrast and hold true gradation.

In his lucid explanation in "Photography for Students," Mr. Derr holds that halation is due chiefly to the reflection of light rays from the inner surface of the glass support, but also to the refraction—the glancing-off, as it were—of light rays from the individual particles of silver bromide contained in the emulsion. That the causes are at least two is shown by exposing a plate with the glass side toward the lens. Were halation due only to reflection it would be entirely eliminated by this placing of the glass, but photographs made in this manner show its presence, although in less marked degree than when the plate is faced the other way. And fur-

THE TWO HIGHWAYS. A. L. HITCHIN.

ther, although the rear surface of a celluloid film has no reflecting ability, a film-supported emulsion will show halation.

What we require is a method that will secure shadow detail before the most intense high light has been over-exposed. Consider, for instance, an open landscape under light conditions that would call for an exposure of 1/10 second at F/22. Now take a photograph of a room with a window overlooking that landscape, the light in the room calling for a ten minute exposure at the same stop; the view out of the window would then be over-exposed six thousand times. If a plate could be made with sufficient latitude to retain gradation under such conditions, our halation troubles would be over.

As matters stand, double-coated and backed plates give good results within their limits—but they have their limits. It would be interesting to try out a backed double-coated plate; a combination that is not on the market. I suggested the possibilities of such a plate to Dr. Mees, and he responded that so little would be gained as not to make it worth while. He undoubtedly knows whereof he speaks, and I should like to know the reasons why—or why not.

It is possible, as we all know, to reduce halation by development. There is the M-Q formula without carbonate, the pyro-soda with minimum carbonate, and in last year's *Annual* Zerbe told us great things of his dilute pyro-acetone; Lovelace, too, urges full exposure, scant development in strong developer, and probable intensification as an aftermath.

Here, however, we get into the slough of lost gradation and flatness, which is in the natural course of events. A developer short of the density-giving element brings up the shadow and high light detail together; the shadow detail is printable before the high lights are sufficiently dense to show the effects of halation, and gradation is, in consequence, incorrect. If development is continued to give true contrast, our friend halation will be found strictly on the job. One point in regard to halation, which is borne out by experiment but which is not generally understood, is that it is evidently the red rays that make the trouble. Here is a field that is worthy of study.

Although my title is in the form of a question, it can be seen that I do not propose to supply the answer. If we ever get the answer, it will come as the result of the work of many minds; the suggestion of one will be mulled over by a second and experimented with by a third, until, let us pray, we may turn to the advertising pages and learn that it is to be bought at the shop around the corner. But will it be something new in plates, an automatic halation-ejecting developer or a green filter with polka dots? It is on the knees of the gods!

SWEETHEARTS. A. MC FARLIN.

PHOTOGRAPHY AT THE EXPOSITION

By ROY HARRISON DANFORTH

THE Pacific Coast, ordinarily denied salon privileges by its distance from the places where salons usually are held, had its opportunity this year at the Panama Pacific International Exposition at San Francisco. The West quite dominated the exhibit of pictorial photography which was housed there, and that despite the large proportion of excellent photographs submitted by eastern photographers. California, Oregon and Washington pictorialists exhibited their work in a profusion that displayed their pride in it and in a variety of western treatments that betrayed their pride in their West.

There was a general excellence about the exhibit that made it specially pleasing and that stood as high compliment to the men who chose the pictures to be hung. Variety was there too, not only in subject matter but in treatment as well. About three hundred pictures were hung in a long and adequately lighted gallery in the Liberal Arts Palace, once more the dominance of les arts plastiques preventing their hanging in the Palace of Fine Arts. About two score photographers were represented, of whom a half or more had at least three pictures each on the walls.

Though the West was most largely represented, well-known eastern names appeared in profusion in signature to the prints. Alvin Coburn showed some striking sepias of an excellent color and varied in subject matter. "From a California Hilltop" was a beautifully pictorial treatment of what many a less experienced photographer would have passed by as too ordinary a country landscape. "The Temple" was a treatment in excellent chiaroscuro of an Arizona mountain scene, while "Broadway at Night" was a sepia vivid enough in its realism to make many a Gotham visitor homesick.

W. G. Shields exhibited "The Village Fishing Pond," a land-

MOTHER AND CHILD. LAURA ADAMS ARMER.

scape in very good tone, while Dwight A. Davis had two dainty garden scenes which attracted much comment. Harry L. Samm showed two soft and effective exteriors. Two very striking nudes were displayed by Louis A. Goetz. The figures were well placed and, though small, quite dominated the landscapes in which they were placed.

Turning to the Pacific Coast work, there were twelve pieces submitted by W. E. Dassonville of San Francisco which were given much merited praise. These included several beautiful portraits, in which excellence in the handling of the general pose was specially shown. Striking in its simplicity, and in a peculiar yellowish gray tone under the gallery light, was the "Portrait of a Child," which was one of the best things Dassonville had. A beautiful head of John Muir, betraying at once the strength and the gentleness of the naturalist, was hung near it. Carmel, that Mecca of all wise western pictorialists, had been drawn upon by the exhibitor for some good sea-and-land compositions. California shows Carmel much as it shows Yosemite Valley and the University of California to all comers, but upon Carmel it only dilates to the artistic—and usually makes disciples of them.

Mrs. Anne Brigman of Oakland displayed another dozen pieces in her very striking treatment of the nude. Mrs. Brigman's works are Poe translated into pictures. The "misty mid-region of Weir" moans in every alternate one of them. Yet, though her work shows a distinct tendency toward the fanciful, it lacks neither power nor the sense of action, overcoming the difficulties of the method by an intelligent planning for the climactic. "The Soul of the Blasted Pine," "The Goblin Tree" and the "Ballet de Mer," the last a photograph of herself, were especially meritorious, the chiaroscuro in the last named being beautifully expressed.

Francis Bruguiere of San Francisco exhibited an even larger group of photographs, the bulk of them being photographs of buildings at the exposition. Certainly in the West no better architectural photography has recently been shown. The buildings were treated in a subdued lighting scheme, and gave an irrepressible sense of majesty and power. There was something more than mere lines about the pictures; there was soul, as well. Two photographs of Ruth St. Denis were

GOLDFISH.

Sidney V. Webb.

shown, especially remarkable for their rather sensational lighting and posing, and three others of a more spirituelle treatment of Roshanara. Bruguiere is especially tasteful in framing and mounting, understanding well the value of mount space about many photographs.

Imogen Cunningham exhibited several figure studies in a pleasing subdued tone. The peculiarity of her pictures was a utilization of the whole picture space for her figures, a method that gives unusual results in many cases of figure work. Bianca Conti, who has succeeded to Arnold Genthe's studio and to much of the State's appreciation for him, displayed some of the best portrait studies in the exhibit. Her "Charlotta Monterey" and "Merle Maddern" were beautiful bits of work, indicative of grace in every line and characterized by a feeling of repose too rare in this sort of work.

Maud Jay Wilson's pictures were specially successful in their finish in very light tone, especially several exteriors. Some of her work has the charm of the more graceful Japanese pictures.

Laura Adams Armer of Berkeley offered several pieces in an unusual method giving a semblance to bas reliefs. Her photographs showed an especial happiness in the handling of the nude, an extraordinary and classical chasteness being lent them by the rather flat treatment. A mother and child group which she showed was easily the best of several of this subject in the gallery.

Among the exhibitors with three or more pictures hung were the following: John M. Cushman, Jamestown, New York; H. H. Latimer, Boston; Arthur D. Chapman, New York; Karl Struss, New York; Angelo Romano, Philadelphia; Alvin L. Coburn, London; Dr. J. Ruzicka, New York; Clarence H. White, New York; Dr. A. D. Chaffee, New York; Charles H. Barnard, New York; Edward R. Dickson, New York; George H. Seeley, Stockbridge, Massachusetts; Jesse T. Banfield, San Francisco; Henry Beiger, Jr., Portland, Oregon; W. E. Dassonville, San Francisco; Anne Brigman, Oakland; Francis Bruguiere, San Francisco; Imogen Cunningham, Seattle; Bianca Conti, San Francisco; Maud Jay Wilson, Palo Alto, California; Laura Adams Armer, Berkeley, California; Henrietta E. Kibbe, Portland, Oregon.

SIMPLY FOOLISHNESS

By REV. H. H. WILLIAMS

THINKING over what would be the most useful subject I could write about, I asked a friend who has charge of the amateur work in a large studio, what were the commonest faults in the films that passed through his hands. He answered "in lighting and exposure." I then inquired "Do you find many worth preserving as pictures?" He laughed as he replied "Very few indeed, nearly all, simply foolishness."

Let us take just those three points. "Lighting" in a picture of any kind is one of the most vital points. Go to a good collection of paintings, or examine good reproductions (Perry pictures will do). Take ten or twelve, look them over carefully and find out which way the light falls. An hour spent this way will, if you have any memory help you very much. Look at the shadows (I am speaking of out door work) and you will see how greatly they help. Then go to some place you know well, early in the morning, at noon and again an hour before sunset. Use your eyes diligently, and you will see that the first and last will stand out well, at midday though you may see detail in plenty. All will look "flat," no "life" at all in it.

Between eleven and two o'clock is the worst time during summer to attempt picture making. I grant you have sun, and so can "snap" all you wish, BUT, something more than that is wanted, i.e. if you wish for something that will be worth preserving. Did you ever notice how rarely you see good photographs from the tropics? In nearly all of them the sun is too nearly overhead, and you will see trees with shadows smaller than themselves.

Now about exposure; this is the most difficult point in photography. If this be correct the remainder is very easy indeed. Exposure meters are not of very much use for learning to use them is by no means as easy as the inventors and

RAMPARTS, UNIVERSITY OF VIRGINIA.

REV. H. H. WILLIAMS.

sellers of them would have you believe. The only "Royal Road" to correct exposure is experience, and careful use of your note book. Put down particulars as you make each picture and *then take your book with you next time,* and look what you did under similar circumstances.

This, however, is what the ordinary "Snap-Shottist" will not take the trouble to learn anything about. You show them a film they have exposed, and when they see the shadows clear glass and their friend's white dress just a black mass they will tell you that, "you spoiled it in developing." The other day I was going down our front steps, and there I found a fair Kodaker hard at work. She called out "Let me make one of you, Mr. Williams." I replied "All right but make it from there," pointing away to one side of where she was standing. She rather demurred, but finally did as I advised. She had the film developed by a well known firm, and cannot understand why my portrait is the only moderately good thing in the lot. She had not used her brains in the least, just placed her subjects on the steps and gone straight down the path.

Nearly all "snap shots" are under-exposed, for the ordinary cheap hand camera of any make has not a high speed lens, and can not be expected to make snaps under trees or in the shade. If those who own instruments of this kind, and I suppose they must be at least ninety per cent. of the great army of "Push Buttoners," would confine themselves to snapping out in the open, they would be greatly delighted at the increase of printable films they would get.

"Thirdly, and in Conclusion." Look through any collection of "Snaps" and how many will you find that you would care to have a print of just for its own value as a picture? Ninety five per cent. will, as a rule, fully justify my friend's remark "Simply Foolishness."

Now if these good people would now and then (just for a change) think for a few minutes, "will what I am trying for be of any value after I have made it?" they would find to their great gratification an immense improvement in their work. When their friends saw these pictures they would admire and envy them, and not pass them by as, "Simply foolishness."

Figure 1.

THE PROTECTIVE MIMICRY OF NATURE

By HARRY G. PHISTER

DURING many years' experience in photographing birds, their nests, and young I have been particularly impressed with the protective mimicry of nature, which is especially noticeable in the ground nesting birds. Subjected as they are to many enemies it is necessary that nature should take some means to protect them. This is done by giving them a color which blends with their habitat, many of the ground nesting birds being a brown color which matches the dead grasses and leaves of their nesting places.

Examine the photograph of the woodcock (Figure 1), reproduced with this article. Notice how nicely she matches her surroundings. This bird will not leave the nest, so secure does she feel in her protective coloration, until one is near enough to touch her so that it is quite easy to photograph her after one has been so fortunate as to find a nest. The one shown herewith was found by one of my farmer friends who, knowing that I was interested in this class of subjects, sent word to me and, as the woodcock is quite rare in this locality, I immediately hastened to the spot. It was some time before I could see the bird when I was standing within a few feet of the nest and if I had not had a guide I do not think I could have found it.

The bird did not make the least movement while I set up my camera about six feet from the nest and made an exposure. I then moved to within less than three feet and made the picture shown in the accompanying illustration (Figure 1), and I think you will agree with me that it is quite difficult to find the bird.

The young kingfishers shown in the second illustration (Figure 2) also afford a good example of protective coloring.

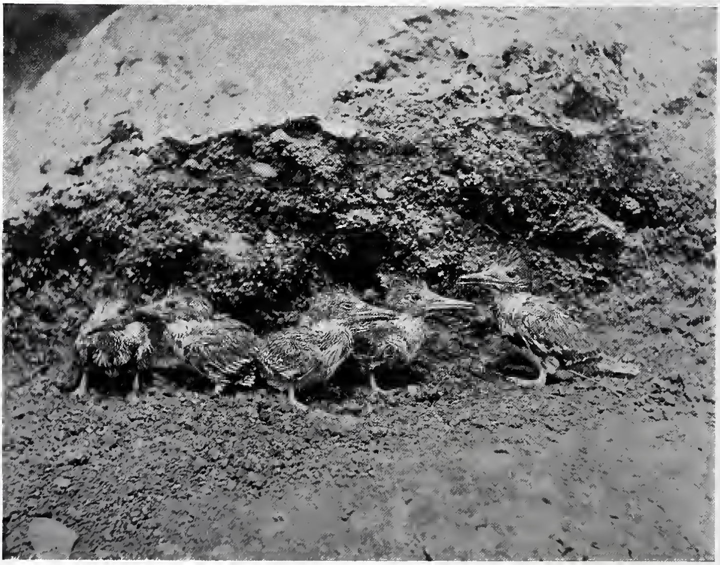


Figure 2.

WELL HIT.
Illustrating article "Garden Portraiture and the Reflex," on Page 296, by A. W. H. Weston.

GARDEN PORTRAITURE AND THE REFLEX

By A. W. H. WESTON

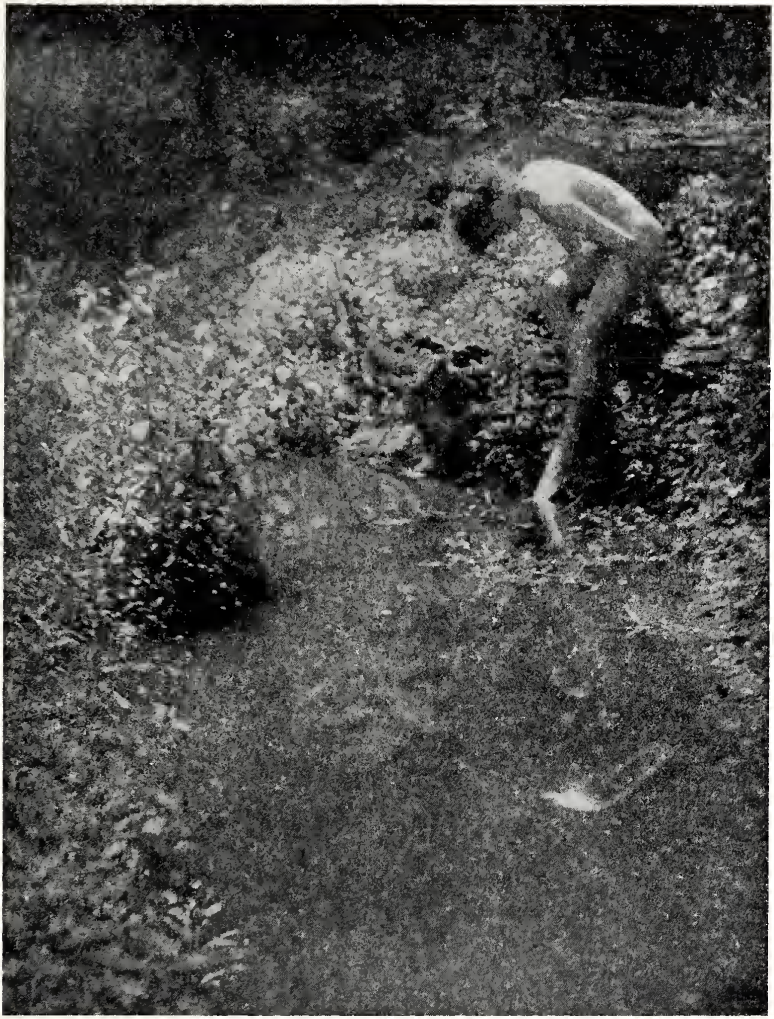
IN going more deeply into any one particular application of photography it is interesting and instructive too to note the gradual selection of apparatus which we make for that one particular field, trying and selecting until at last we attain to the most practical ideal, while our dreams may extend still further to ideals as yet unattainable.

In venturing upon portraiture in a garden we do so perhaps as novices with a camera which gives no hint of the direction in which our ambitions will finally extend. Because the lens is slow we soon learn that we cannot take "quick" pictures in a decently softened light, and that neither can we take decently modelled portraits in the glaring sun. Apart from that the focus troubles us little. The depth of focus is so good with this small lens that anywhere thereabouts will do for focus.

If we have a logical mind we see the error of this small lens. We avoid the sun, but then too we tire of those posed pictures for time exposures in the shade. The most logical step is a rapid lens with the idea of getting more arrested animation in our portraits, but here more trouble begins. The trouble this time is the focus. With a lens working at F/6, or F/4.5 in half plate or even in quarter plate size our judgment of distance must be near perfection to get anything like sharpness, and if we are taking children it must be arrived at in a moment.

It is this trouble, and the need of a really good finder for near objects that makes the Reflex camera such a boon, and anyone who has passed the stages I have indicated looks to the Reflex for full deliverance from his troubles.

The Reflex is undoubtedly a big step in the right direction. It shows us a full size image the right way up exactly as it



HALF AFRAID. Kate Smith.

will appear in our photograph, and with no error of placing on the plate as with almost any other kind of finder. This image which we can watch right up till a moment before exposure can be focused till the last moment exactly as though we were focusing on the sensitive plate itself.

Small wonder that we expect almost too much from this wonderful camera. We imagine ourselves taking children in some charming garden, following them round with our eyes buried in the focusing hood, focusing as we go until some happy pose presents itself when we press and it is ours. How very rarely could we really do this, for to start with, how few children could be naturally interested in anything else while a man is manoeuvering 'round with his eyes buried in the conning tower of a big black box. To make it at all possible there must be some strong counter attraction.

Then too the photographer himself finds it is not easy to follow the expression of the sitter by looking at the screen, and since there is a period (short though it may be) between the first raising of the mirror and the release of the shutter, we must lose sight of the sitter for a moment during which the expression may change considerably, or even the pose be altered.

We find then in practice that it is better to look at the sitter and not at the screen at the moment of making the exposure. In fact, it is best to watch the sitter all the time and only to glance into the hood of the reflex to adjust any difference of focus caused by the sitter moving about. For this reason it is useful to have the camera in a very light, very rigid and low stand that the whole can be moved about bodily and planted down in an instant. This leaves one more free to entertain or amuse the sitter, the beauty being that any alteration in focusing can be done in an instant and the plate is always ready for exposure.

One complaint I have against the reflex is that the shutter is usually too needlessly fast and too noisy for portraiture. If we could have a shutter working on the principle of a studio flap shutter and as noiselessly it would be a boon. Then too, we miss the swing back as an aid to focusing and very few reflex cameras can compensate us with a swing front. True the low viewpoint of the reflex is all in its favor for children and makes a swing back less necessary in focusing a standing figure.

With a large aperture lens we must know where to focus, for with such little depth it is often impossible to get the whole of the subject sharp. Sometimes it must be a compromise so that at no particular point do we get the best focus the lens will give, or else we must stop down to quite a small aperture and here the stand is useful to prevent camera movement with the longer exposure necessary.

In the absence of a stand a shoulder sling is useful to steady the camera, but for the best effect the camera must be strapped very near to the eyes and strapped so high a half-plate reflex becomes a burden hard to be borne.

When all has been said for and against the reflex it must remain one of the most efficient types of camera we have at present for that most fascinating subject, the garden portraiture of children. It needs to be constantly used and thoroughly understood to appreciate its full utility, and to adapt one's own idea and ingenuity to that end.

THE BREAKING WAVES. W. C. SAWYER.

DOING ALASKA WITH A KODAK

By P. S. HUNT

NOW that the U. S. Government is building a railroad in Alaska, it is quite certain that many people will visit the territory this summer, but after they have returned home and noised their experiences, and the real construction has gotten well under way, 1916 will see an immense travel. Calculating the usual average of kodaks among such tourists and settlers, with some sixteen years experience, a few words of warning will be very appropriate at this time and especially in this *Annual* where it will be readily located when wanted.

First, kindly understand you are coming to a country that has grander scenery than any other on earth, mostly mountain and water ways among the many hundreds of islands. You will realize what this means, high and in many cases snow capped mountains against a clear blue sky, in some cases well lighted at the base but most of them dark, and the contrasts so great that the average amateur will not know just the best way to get the best results possible out of the view. To go into the matter fully will be sure to confuse you; to let you come here and get the usual results of strangers would be criminal, actually criminal.

The first warning I want to give is keep your films or plates out of your hot stateroom. Scarcely a person that has not made the trip more than once brings back anything worth while, and every roll shows the effects of heat in the stateroom which is naturally more marked on such a trip than on a trip on land. The heat together with the air from the water is very detrimental, while if the films are left out in the open air they will show no bad effects. Above all, after opening the package to the air do not confine it to an air tight receptacle; leave even the tinfoil off, put it back in the carton alone.

Next use a film sensitive to most colors; do not forget a good medium shade ray filter, especially if you have a medium priced kodak. You will want to separate the white snow from the blue sky in a very large number of your exposures, and it is the only thing you can do if a blue haze hangs over the scene as is the case so often no matter what grade of camera you have.

As to the mountains and sky, if you have a high grade camera, with a high speed shutter you can accomplish the desired results, nearly as well as with a filter, by using a little larger stop and a much higher speed, but this will not have any effect on the blue haze. You must make that green by the use of a yellow filter.

In leaving the States on the ship you will immediately see something to photograph. These things will come along faster than you can take care of them, most of the time on the entire trip, for as I said at the start this is the greatest camera country on earth, and to be honest with you a person is foolish to come here without one of some grade, if it is nothing more than a dollar Brownie. There are dealers in every town where supplies can be bought.

Now, as to the exposures, it is of course impossible to tell definitely just the amount. However, if the sky is clear the following will be found to give you much better results than you will obtain if you disregard them.

Mountains at considerable distance across the water will need a ray filter almost every time. If there is a wind blowing you can get a very good result by using an US 16 stop, with 1/100 second exposure, no filter. If the sun is striking the mountain very strong so that it is dazzling you might get a splendid negative from the same exposure with the US 32 stop. With a so called four times ray filter use the US.8 stop. Under these conditions the filter does not require four times the exposure.

For near views of the mountains you will have to give a different exposure. In coming up the "Inside Passage," that is from Seattle to Sitka or Icy Straits, you will have to change speeds every time you expose. If you have good light and the subject is evenly lighted the US.16 with a 1/25 second exposure will give excellent results. If the lighting is

LOOKING DOWN THE CANYON FROM NEAR THE NEW DAM, SOLOMAN GULCH, VALDEZ BAY, ALASKA.

P. S. HUNT.

very contrasty use the largest stop and a quick exposure. Here is where a high grade camera is very effective, as F.4-5 with a 1/330th second exposure will accomplish wonders. If you have very good light the same exposure and F.8 will do fine, that is on a contrasty lighted subject; if the subject is fairly well lighted all over and a snow capped mountain F.16 will give excellent results with the same 330th second exposure. If there is considerable shadow in the parts wanted it will be well to use F.8 and a 1/160 second exposure.

Another point is that considerable shadows from the roughness of the formation will give you a very much more interesting picture. A snow capped mountain taken with the sun at right angles is worth a dozen where the sun shines from your back.

The principle to be remembered is that a large stop with a high speed has a tendency to give flatness, gives a contrasty subject better results, and will be as good as using a ray filter. If the subject is flatly lighted a small stop with more time will add much to the results, and tend to increase the contrast. If there is a blue haze the only salvation is the use of a yellow ray filter, and in most cases that will not prove entirely satisfactory. The idea is to turn that blue haze or blue sky into a green haze or sky, and retard the action of the light reflected from it. The white snow will be yellow light which is much lighter than green and will act much more readily. Then the ortho films or plates are much more sensitive to the yellow than the green. Films are much better in many ways than plates, but if plates are used they should be orthochromatic.

After entering the Prince William Sound you will find that the same exposure under the same conditions of light as in the States will give you about the same results, but when getting into narrow passages it will be advisable to apply the principles given above. When entering any of the bays off the sound be careful that the mountains do not cut off any of your light.

For the usual view in the various towns the light is not quite as strong as in the States. Or to be more correct, the light is as strong but the mountains cut off much more than you realize. Then too, you will with a high grade kodak be able

SOAP AND WATER. HELEN W. COOKE.

to take snap shots twenty out of the twenty-four hours in June and fore part of July.

The greatest errors made by the average amateur is over-exposure for distance and under-exposure for near views. So many think that this or that thing is so far away they will have to give plenty of exposure to get it, and when the object is near they will have to be careful not to over-expose. Be sure that you just reverse those notions. Less exposure for the distant views and more for the near ones.

If you wish to take one of the high mountains that is well lighted all over use a medium small stop and fairly quick exposure; if you wish to take one that is well lighted at the top and dark below, use a ray filter or a very large stop and very quick exposure.

A ray filter is almost necessary in all cases if you wish to take glaciers, and you surely will.

IN WINTER'S GRASP. CHAS. W. DOUTT.

American Annual Formulary

In the following section we have gathered together a typical collection of Formulæ and Tables, which will assist the photographer in his every-day work. It will be noticed that makers' formulæ are omitted. These can best be obtained by direct application to the makers. The appended formulæ are selected from the working methods of practical photographers.—Editor.

TANK DEVELOPERS FOR NEGATIVES

Adurol (Montgomery). Water, 20 ounces; sulphite of soda (anhydrous), 220 grains; carbonate of soda (anhydrous), 220 grains; adurol, 45 grains. For use take 1 ounce of above to 4 ounces water; add 2 drops 10 per cent. bromide solution; temperature, 65 degrees; time, 25 minutes.

Glycin (Montgomery). Water (hot), 8 ounces; sulphite of soda (anhydrous), 50 grains; carbonate of soda (anhydrous), 240 grains; glycin, 45 grains. For use take 3 ounces of above and 37 ounces water; temperature, 65 degrees; time, 25 minutes.

Metal-Hydro (Frew). Water, 12 ounces; metol, 7½ grains; sulphite of soda (anhydrous), 274 grains; hydroquinone, 30 grains; carbonate of soda (anhydrous), 150 grains; bromide of potassium, 2 grains. For use to each ounce of above add 4 ounces of water; temperature, 65 degrees; time, 12 minutes.

Ortol (Smith). Water, 60 ounces; metabisulphite of potassium, 15 grains; sulphite of soda (anhydrous), 100 grains; carbonate of soda (anhydrous), 100 grains; ortol, 30 grains; temperature, 65 degrees; time, 20 minutes.

Rodinal (Agfa). Water, 60 ounces; rodinal, 1 ounce; temperature, 65 degrees; time, 25 minutes.

TRAY DEVELOPERS FOR PLATES AND PAPERS

Adurol—For Plates. No. 1.—Water, 10 ounces; sulphite of soda, 1¾ ounces; adurol, 85 grains.

No. 2.—Water, 10 ounces; potassium carbonate, 1¼ grains. For average outdoor exposures use equal quantities Nos. 1 and 2; for fully timed exposures take 1 ounce each of No. 1, No. 2 and water.

Amidol. A concentrated developer for plates.—Water, 13 ounces; sulphite of soda (crystals), 2½ ounces; when dissolved add amidol, ¼ ounce. The solution keeps fairly well in bottles completely full and well corked. For use take 1 ounce of the concentrated solution and dilute with 3 or 4 ounces of water.

Amidol. For gaslight papers.—An excellent developer for those subject to metol poisoning. (V. Serin.) Amidol, 60 grains; sulphite of soda crystals, 650 grains; potassium bromide, 10 grains; water, 20 ounces. Will keep only three or four days. Time of development about ½ minute.

Duratol-Hydroquinone—Universal Developer (M. D. Miller).—Hot water, 16 to 32 ounces; duratol, 15 grains. Dissolve and add, previously well mixed in the dry state, sulphite of soda, anhydrous, 440 grains; carbonate of soda, anhydrous, 660 grains. When dissolved, add hydroquinone, 60 grains. Add water to make 40 ounces. Use undiluted for contrasty gaslight papers. Dilute with an equal part of water for soft gaslight and bromide papers, plates, and films. For tank development of 65° Fahr. Dilute 1 to 1 and develop 12 to 15 minutes. Dilute 1 to 2 and develop 16 to 22 minutes. Dilute 1 to 3 and develop 26 to 34 minutes. Developer without bromide gives blue-black tones; small quantities of bromide give pure black; larger amounts, warm blacks.

Edinol-Hydro—For Panchromatic Plates.—Water, 30 ounces, edinol, 120 grains; hydroquinone, 120 grains; sulphite of soda (dry), 768 grains; carbonate potassium, 1344 grains; 10 per cent. bromide potassium solution, 1 dram; 10 per cent. oxalic acid solution, 1 dram. For tank use 1 ounce of above to 15 ounces water; temperature, 65 degrees; time, 15 minutes. For tray use 1 ounce above to 4 ounces water.

Edinol-Hyrdo Developer—For Plates and Papers (W. S. Davis).—Water, 8 ounces; edinol, 10 grains; hydrochinon, 15 grains; sulphite of soda (dry), 100 grains; carbonate of soda (dry), 150 grains. May be used full strength for gaslight paper, also for plates and bromide paper if desired. (Normal time of development at 60-65 degrees Fahr. Two minutes for plates.) Time of development is increased in proportion to amount of water added.

Eikonogen.—An excellent developer for under-exposed portrait negatives. (B. H. Allbee.) Eikonogen, 125 grains; sulphite of soda (dry), 125 grains; carbonate of soda (dry), 125 grains; bromide of potassium, 2 grains; water, 10 ounces. For softer effects add up to an equal volume of water. The image appears quickly and builds up fast.

Glycin-Metol—For Plates (M. D. Miller).—Water, 20 ounces; metol, 60 grains; sulphite of soda, anhydrous, 240 grains; carbonate of soda, anhydrous, 440 grains; glycin, 120 grains. Dilute with an equal volume of water. Wash plate thoroughly before fixing to prevent indelible yellow stain.

Hydrochinon.—For over-exposure plates to obtain contrasty negatives (B. H. Allbee). No. 1, water, 8 ounces; sulphite of soda (dry), ½ ounce; hydrochinon, 80 grains. No. 2, water, 8 ounces; carbonate of soda (dry), 1 ounce; potassium bromide, 40 grains. Take equal parts of No. 1 and No. 2. Temperature, 70 degrees.

Metol (H. W. Hales).—Metol, 60 grains; warm water, 16 ounces; sulphite of soda crystals, 1 ounce; carbonate of soda crystals, 1 ounce. Dissolve metol in warm water, then add the sulphite and carbonate in order named. Cool. Can be used repeatedly. For developing papers add a few drops of 10% solution of bromide of potassium.

Metol-Hydroquinone for Orthochromatic Plates.—Water, 20 ounces; metol, 14 grains; potassium metabisulphite, 18 grains; hydroquinone, 56 grains; sulphite of soda, 1 ounce; carbonate of soda, 1¾ ounces. Use 1 drop of a 10 per cent. potassium bromide solution to each ounce only if necessary.

Metol-Hydro-Eiko—For Double-coated Ortho Plates (H. S. Hood).—Water, 15 ounces; metol, 24 grains; hydroquinone, 24 grains; eikonogen, 24 grains; sulphite of soda (dry), ½ grain; carbonate of soda (dry), 320 grains; potassium bromide (10 per cent. solution), 4 drops.

Metol-Hydro-Eikonogen—For Plates (Hood).—Water, 150 ounces; metol, ½ ounce; hydroquinone, ½ ounce; sulphite of soda (dry), 5½ ounces; carbonate of soda (dry), 6 ounces. This can be kept in a hard rubber tank for five days before exhausted by oxidation.

Pyro—For Overtimed Plates (J. D. Elliott).—Sulphite of soda, 40° solution, 4 ounces; water, 4 ounces; pyro, 10 grains. Immerse plates in this solution for 20 minutes in the dark; then add to above solution ½ drachm carbonate of soda, 20° solution. When image appears add one more drachm of the carbonate of soda solution.

Pyro—For Plates (J. D. Elliott).—Sulphite of soda, 40° solution, 4 ounces; carbonate of soda, 20° solution, 4 ounces; pyro, 10 grains.

Pyro-Metol—For Plates (H. M. Long).

A—Water, 22½ ounces; metabisulphite, 2 drams; metol, 60 grains; pyro, 1 ounce. B—Water, 16 ounces; sulphite of soda, 2 ounces. C—Water, 16 ounces; carbonate of soda, 1 ounce. Normally used 1 ounce of each stock to 16 of water.

Pyro Soda—For Plates (Mellen). No. 1.—Water, 20 ounces; sulphite of soda (crystals), 4 ounces; carbonate of soda, 2 ounces. Dissolve the sulphite first and then add the carbonate.

No. 2.—Water, 6 ounces; pyro, 1 ounce. For correct exposures take 1 dram of No. 2; 1 ounce of No. 1, and add 2 ounces of water. For snapshots, or plates thought to be under-exposed, use 1 dram of No. 2; 1½ drams of No. 1, and 6 ounces of water. For over-exposure take 2 drams of No. 2, 1 ounce of No. 1 and 6 ounces of water. Or, instead of the 2 drams of No. 2 in this solution use 1 dram of No. 2 and 10 drops of a 10 per cent. solution of potassium bromide.

Pyro-Metol-Acetone—For Plates (Cramer). No. 1.—Water, 60 ounces; metol, 1 ounce; citric acid, 40 grains; pyro, 1 ounce; sulphite of soda (dry), 6 ounces.

No. 2.—Water, 48 ounces; liquid acetone, 12 ounces. For plates take 1 ounce No. 1, 1 ounce No. 2, water 5 ounces. For tank take 1 ounce No. 1, 1 ounce No. 2; water, 13 ounces.

DEVELOPERS FOR LANTERN SLIDES

Hydroquinone (B. H. Allbee).—No. 1.—Hydroquinone, 150 grains; metabisulphite potash, 10 grains; bromide potassium, 50 grains; water, 20 ounces.

No. 2.—Sulphite of soda (dry), 1 ounce; caustic soda, 100 grains; water, 20 ounces. Take equal parts of No. 1 and No. 2.

Hydroquinone—For Colder Tones (B. H. Allbee). No. 1.—Hydroquinone, 60 grains; sulphite of soda (dry), 1 ounce; citric acid, 10 grains; bromide potassium, 10 grains; water, 10 ounces.

No. 2.—Carbonate of soda (dry), 1 ounce; water, 10 ounces. Use equal parts.

FIXING BATHS AND HARDENERS

Acid Fixing Bath (Carbutt).—Sulphuric acid, 1 dram; sodium hyposulphite, 16 ounces; sulphite of soda, 2 ounces; chrome alum, 1 ounce; warm water, 64 ounces. To prepare the bath, dissolve the hypo in 48 ounces of water; the sulphite of soda in 6 ounces; mix the sulphuric acid with 2 ounces of the water and pour slowly into the sulphite solution, and then add to the hypo solution. Dissolve the chrome alum in 8 ounces of water; add to the bulk of the solution and the bath is ready for use.

Acid Fixing Bath (M. D. Miller.)—Hypo, 8 ounces; water, 1 quart; Lumiere's sodium bisulphite lye, 1 to 2 ounces, to which may be added, if greater hardening is desired, powdered alum, 220 grains.

Fixing Bath for Lantern Slides (B. H. Allbee).—Sulphuric acid, 1 dram; hypo, 16 ounces; sulphite of soda (dry), 1 ounce; chrome alum, 1 ounce; water, 64 ounces.

Plain Fixing Bath.—Disslove 1 pound of sodium hyposulphite in 2 quarts of water or 4 ounces of the hypo in a pint of water, according to the bulk of the solution required.

Hardener for Fixing Bath (Beach). Water, 40 ounces; sulphite of soda (crystals), 6 ounces; powdered alum, 16 ounces; acetic acid, 40 ounces. Add in the order given and shake well until dissolved. Of the above add 16 ounces to each gallon of hyposulphite of soda solution, testing 70 to 80 degrees.

Hardening Negatives.—Immerse them for a few minutes in formalin, 1 ounce; water, 30 ounces.

INTENSIFICATION

Intensifier, One Solution (*F. M. Steadman*). No. 1.—Bichloride of mercury, ½ ounce; water, 10 ounces. No. 2.—Iodide of potassium, 5 drams; water, 1½ ounces. Add to No. 1. No. 3.—Hyposulphite of soda, 1 ounce; water, 2½ ounces. Add to the previous mixture. This clears the solution when it is ready for use for local intensification. For tray intensification add more water to slow its action.

Intensifying with Red Ink (*E. M. Cohen*). Soak the negative well. Put teaspoon of red ink into tray of water and rock until mixed. Immerse negatives face up till well and evenly colored, then without washing put in drying frame. If left in solution too long will be over dense, in which case several trays of clear water will eliminate some of the color.

The intensification is permanent without the danger of negative going bad, as is the case when mercury is used.

Intensifier—Mercuric Chloride Process. No. 1.—Mercuric chloride, 200 grains; bromide of potassium, 120 grains; water, 6½ ounces.

No. 2.—Sulphite of soda, 1 ounce; water, 4 ounces. The well-washed negative, free from hypo, must be thoroughly bleached in No. 1; well washed; and then blackened in No. 2. After blackening it is well washed again.

REDUCTION

Reducer, Single Solution (*F. M. Steadman*).—Red prussiate of potash, size of pea; hyposulphite of soda, six times that volume; water, 6 ounces (for local reduction 1½ ounces). When reduced wash thoroughly.

Reducer—Ammonium Persulphate.—Ammonium persulphate, 15 grains; water, 1 ounce. The solution should be made just before use. The negative must be perfectly free from hypo or it will be stained by the persulphate. When the desired reduction has been reached, transfer the negative without washing to a 10 per cent. solution of anhydrous sodium sulphite. Wash finally for 15 or 20 minutes.

Reducer—Farmer's.—Dissolve 1 ounce of potassium ferricyanide in 9 ounces of water and make up to 10 ounces, forming a 10 per cent. solution. Label this poison. Thoroughly wet the negative to be reduced. Take enough fresh plain hypo fixing bath for the purpose, and add to it enough of the ferricyanide solution to make it a light straw color. The negative to be reduced is immersed in this solution, when it will be seen to lose density. Rock the tray to insure evenness of action. This reducer can also be used for local treatment.

PRINTING PROCESSES

Blue Prints.

Blue Printing Sensitizing Formulæ (*Brown*). A.—Dissolve 110 grains ferric ammonium citrate (green) in 1 ounce of water.

B.—Dissolve 40 grains of potassium ferricyanide in 1 ounce of water. These two solutions are made up separately. They are then mixed together and kept in a stoneware bottle, but the single solution should always be filtered before use. The mixture will retain its good qualities for months if kept from the light.

(*Millen*).—Potassium ferricyanide, 1 ounce; ammonio-citrate of iron, 1½ ounces; distilled water, 10 ounces. Mix thoroughly and filter. The solution should have a deep wine color and dry on the paper a lemon-yellow. If the solution is green and has a precipitate, the ammonio-citrate is old and spoiled. The mixture should be kept from the light.

Bromide Paper.

Bromide Paper Developers: Hydroquinone-metol. No. 1.—Water, 10 ounces; hydroquinone, 52 grains; potassium metabisulphite, 18 grains; sulphite of soda, 5 drams; carbonate of soda, 1¼ ounces.

No. 2.—Water, 10 ounces; metol, 30 grains; carbonate of soda, 5 drams; sulphite of soda, 5 drams. One or two drops of a potassium bromide 10 per cent. solution added to 1 ounce of the mixed developer will increase contrast and keep the whites pure. Equal parts of 1 and 2 give excellent prints from a normal negative; one part of 1 and two of 2 give gray prints with maximum half-tone and gradation; two parts of 1 and one of 2 give vigorous prints from soft delicate negatives.

Amidol for rich blacks (freshly prepared). Distilled (or boiled) water, 4 ounces; sulphite of soda (crystals), 90 drams; amidol, 10 to 15 grains. Add a drop of 10 per cent. bromide solution to each ounce of developer.

Sepia Tones: Hypo Alum.—Hyposulphite of soda, 5 ounces; ground alum, 1 ounce; boiling water, 70 ounces. Dissolve the hypo in the water, and then add the alum slowly. A milk-white solution results which should be decanted when clear. It is not used until cold (about 60° Fahr.).

Sepia Tones: Sulphide of Sodium.—The fixed and washed print is treated with one of the following solutions: (1) Potassium ferricyanide, 10 grains; potassium bromide, 10 grains; water, 1 ounce; or (2) potassium ferricyanide, 20 grains; sodium chloride (common salt), 30 grains; water, 1 ounce. The image will be bleached by either of these solutions in a few minutes, the whitish appearance of the deposit being caused by its change into a salt of silver. After 5 minutes in running water apply the sulphuretting solution: Dissolve 3 ounces of sodium monosulphide in 15 ounces of water; boil the solution for about 10 minutes, filter off the black precipitate formed, and when cooled make up to 25 ounces with water. To tone, take 12 per cent. stock sodium sulphide solution, 1 ounce; water, 12 to 20 ounces.

Red Tones: Copper.—Dissolve 100 grains of ammonium carbonate in 2 ounces of water, and in this solution dissolve 10 grains of sulphate of copper. Then add 20 grains of potassium ferricyanide. A clear, dark green solution results which gives a red-chalk tone in about 3 minutes. Tone until the deepest shadow is converted, and then wash the print for 10 minutes.

Green Tones: Vanadium.—Bleach print in the following: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce. Wash well and apply: Ferric chloride, 2 grains; vanadium chloride, 2 grains; ammonium chloride, 4 grains; hydrochloric acid, 5 minims; water, 1 ounce.

Blue Tones: Iron.—Bleach print in: Potassium ferricyanide, 10 grains; ammonium carbonate, 100 grains; water, 1 ounce; then tone in ferric chloride, 5 grains; hydrochloric acid, 5 minims; water, 1 ounce.

To prevent blistering on bromide paper (P. L. Anderson).—Immerse after fixing and before washing from 10 to 15 minutes in water, 10 ounces; formaldehyde, 1 ounce. A 10 per cent. solution of chrome alum will do equally well.

To make bromide paper translucent (P. L. Anderson).—Lay the paper negative face down on a blotter and paint thinly with the following mixture. Give three coats. Turpentine, 3 ounces; powdered resin, 1 ounce; gum elemi, 1 ounce; paraffine wax, ½ ounce. Heat with stirring until it begins to boil. Allow to cool slightly and add turpentine, 3 ounces.

Carbon Tissue.

Carbon Tissue, Sensitizer for (P:nnett).—Potassium bichromate, 4 drams; citric acid, 1 dram; strong ammonia water, about 3 drams; water, 25 ounces; dissolve the bichromate and citric acid in hot water, and add sufficient ammonia to change the orange color of the solution to lemon-yellow. Sensitize for 90 seconds; reducing the water softens the gradation in the print; increasing it to 30 ounces gives more vigor.

Carbon Lantern Slides.—Prepare the glass by coating with the following preparation: 180 grains of Nelson's Gelatine No. 1, in 20 ounces water. Add 10 grains bichromate of potash. Dry and allow the plate to be exposed to light for a couple of days to make the coating thoroughly insoluble. Sensitizer for tissue: 1 per cent. to 1¼ per cent. solution of bichromate of potash. Immerse 2 minutes. Print deeply; expose twice as long as ordinary paper print. Develop in hot water as usual.

Gum Bichromate.

Gum Bichromate (Caspar Millar). A.—Gum arabic, 1¼ ounces; water, 3½ ounces; salicylic acid, 4 grains.

B.—Chrome alum, 45 grains; water, 3½ ounces. Grind A and B with water and pigment, brush over paper, dry and store.

Suggested formula.—A, 2 ounces; B, 1½ drams; carbon black, 10 grains; sensitize for 2 minutes in 5 per cent. bichromate solution.

Kallitype.

Kallitype Sensitizer for Black Tones (J. Thomson).—Distilled water, 1 ounce; ferric oxalate (Merck's or Mallinckrodt's) 15 grains; citrate of iron and ammonia (brown scales), 25 grains; chloride of copper, 8 grains; oxalate of potassium, 35 grains; oxalic acid, 15 grains; silver nitrate, 15 grains; gum arabic, 10 grains. For greater contrast add 1 to 10 drops 5 per cent. bichromate of potassium solution.

Developer: Stock Solution.—Distilled water, 1 ounce; silver nitrate, 40 grains; citric acid, 10 grains; oxalic acid, 10 grains. Filter. Normal developer 1 dram stock solution and 7 drams of water.

Platinum Papers.

Platinum Sensitizer (P. L. Anderson).—Stock solutions: I. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains. II. Water, hot, distilled, 2 ounces; ferric oxalate, 240 grains; oxalic acid, 16 grains; potassium chlorate, 4 grains. III. Water, distilled, 19 drams; potassium chloroplatinite, 219 grains (= ½ ounce). Keep in amber glass bottles or in the dark. For use take: I, 22 mm.; II, 0 mm.; III, 24 mm. Gives very soft prints. Or, I, 12 mm.; II, 10 mm.; III, 24 mm. Results about the same contrast as a P. O. P. print. Or, I, 0 mm.; II, 22 mm.; III, 24 mm. Gives extreme contrast.

Above quantities sufficient for a 10 x 12 sheet of ordinary paper. Very smooth requires less and very rough more, up to 25 per cent. additional. Apply with a soft fitch or camel-hair brush, allow to surface dry, and make bone-dry over a stove or gas-jet. Should dry in not less than five or more than ten minutes.

Platinum: Sensitizing Gold Bath and Sepia Papers. A.—Chloroplatinite of potassium, 15 grains; distilled water, 90 minims.

B.—Ferric oxalate, 21 grains; oxalic acid, 2 grains; distilled water, 183 minims. For cold bath paper, mix A and B, and add 15 minims of water. For sepia paper mix A and B and add 15 minims of a 5 per cent. solution of mercuric chloride. The addition of a few grains of potassium chlorate to any of the above gives increased contrast in the print. From 140 to 170 minims of solution are sufficient to coat a sheet of paper 20 x 26 inches.

Platinum Prints: to Intensify. A.—Sodium formate, 45 grains; water, 1 ounce.

B.—Platinum perchloride, 10 grains; water, 1 ounce.

C.—For use, take 15 minims each of A and B to 2 ounces of water. Immerse prints until sufficiently intensified, then remove and wash.

Platinum Prints to Distinguish from Bromide.—Soak the print in saturated solution of mercuric chloride; a platinum print will not change; a bromide print will bleach.

Salted Papers.

Salted Paper Prints: Sensitized with the following:—Silver, 480 grains Troy; water, 11 ounces. Dissolve and pour off 2 ounces, and to the 9 ounces left add strong aqua ammonia to form a precipitate and redissolve the precipitate, then add the remaining 2 ounces which will form another precipitate, to this add 9 drops of nitric acid C. P. Apply this to the paper with a tuft of cotton.

Any good Toning Bath will give good results, such as: Chloride Aluminum, 80 grains; bi-carbonate soda, 360 grains; water, 48 ounces. When mixed this will form a flocky hydrate which will settle to the bottom. It can be strained through clean washed muslin. To prepare a small bath for toning, take 12 ounces of the stock solution and add sufficient gold to tone in 8 to 10 minutes. The gold solution must be neutralized with bi-carbonate soda before adding to the above bath. When the prints reach the desired tone throw them into a bath of salt water, made of water, 1 gallon; table salt, 1 ounce.

Printing Out Papers.

Gold Toning (B. H. Allbee). No. 1, 10 per cent. solution sulphocyanide of potassium; No. 2, 15 grains chloride of gold in 7½ ounces of water; No. 3, 10 per cent. solution phosphate of soda; No. 4, saturated solution borax. Take No. 1, 1 dram, water, 8 drams; No. 2, 4 drams; No. 3, 1 dram; No. 4, 2 drams. In this put print in dry. Toning should be complete in two minutes. Wash as usual.

Gold Toning.—For blue-black tones, for slight strengthening, and for converting rusty black into pure black. Soak print in warm water, lay on warm glass, brush over glycerine and blot off. Pour on few minims of solution of gold chloride (1 grain per dram), and rapidly brush in all directions. When toned, rinse, and sponge back and front with: Metol, 50 grains; sodium sulphite, 1 ounce; potassium carbonate, ½ ounce; water, 20 ounces. Tone in daylight. Do not tone sepias or old prints in this solution.

MISCELLANEA

Adhesive for Labels.—Soak 1 part of the best glue in water until thoroughly swollen, add a little sugar candy, 1 part of gum arabic and 6 parts of water. Boil with constant stirring over a spirit lamp until the whole gets thin. Coat sheets of paper with it; let dry and cut up into convenient sizes.

Autochromes.—Sensitizing to get more speed. (M. G. Lovelace.) In complete darkness bathe plates in the following solution: Distilled water, 66 cc.; ethyl alcohol pure 90 deg., 33 cc.; dye solution, 2 cc.; ammonia, .30 cc. The dye solution is a mixture of pinachrome, pina verdol and pinacyanol, 1 part of each in 1000 of alcohol. Bathe plates for five minutes and dry away from dust. These plates require a special filter the formula being: Hard gelatine, 3 gms.; distilled water, 100 cc.; filter yellow K, 1 per cent. solution 2.5 cc. Use 1 cc. to each 10 square centimeters of surface. These plates have about five times the speed and it is possible to make snap shots with them if a lens working at F/4.5 and F/5.6 is used.

Blacking Mixture.—Dissolve a 4-ounce stick of licorice in 8 ounces of water with the aid of gentle heat. When dissolved rub into the mixture 1 ounce of burnt sienna in powder, using the back of a spoon for this purpose. When cold, bottle for use.

Blackening Brass.—Make two solutions: Copper nitrate, 200 grains; water, 1 ounce. Silver nitrate, 200 grains; water, 1 ounce. Mix the solutions; clean the article well; dip it in the solution for a moment; withdraw it; dry it; and heat it strongly.

Black, Dead, for Wood.—Shellac, 40 parts; borax, 20 parts; glycerine, 20 parts; water, 500 parts. When dissolved, add 50 parts aniline black.

Cleaning Greasy Bottles.—Wash with benzine, or permanganate of potassium, to which has been added some hydrochloric acid.

Bottles that have contained resinous substances, wash with potash or soda and rinse with alcohol. Bottles that have contained essences, wash with sulphuric acid, then with water.

Clearing Stained Negatives.—Dissolve ⅛ ounce of pulverized alum in 20 ounces of water and add 1 dram of sulphuric acid. Immerse the stained plate in this solution for a few minutes; remove plate, wash, and then set in the rack to dry.

Film: to Remove from Glass: Make two solutions. A.—Sodium fluoride, 6 grains; water, 4 ounces.

B.—Sulphuric acid, 6 drops; water, 1 ounce. Place the negative in solution A for 2 minutes and then place directly in solution B. After another 2 minutes lift the film with the finger from one corner of the plate. It will soon leave the glass.

Firelight Effects on Developing Paper (H. S. Hood). No. 1.—Water, 5 drams; copper sulphate, 10 per cent. solution, 15 minims; ammonium carbonate, 10 per cent. solution. Add till precipitate first formed is redissolved.

No. 2.—Water, 4½ ounces; potassium ferricyanide, 6/10 drams. Mix separately and add No. 2 to No. 1. The print will turn bright red. Wash well.

Ground Glass: Substitutes for. 1.—Paraffine wax makes an excellent substitute for ground glass if the latter should get broken. Iron the paper onto a sheet of plain glass. It is more transparent than the focusing screen and the image will appear clearer; hence, in exposing allowance must be made for the difference in illumination.

2.—Resin dissolved in wood alcohol and blown over the glass; this must not be scratched; it gives a very fine-grained ground glass effect.

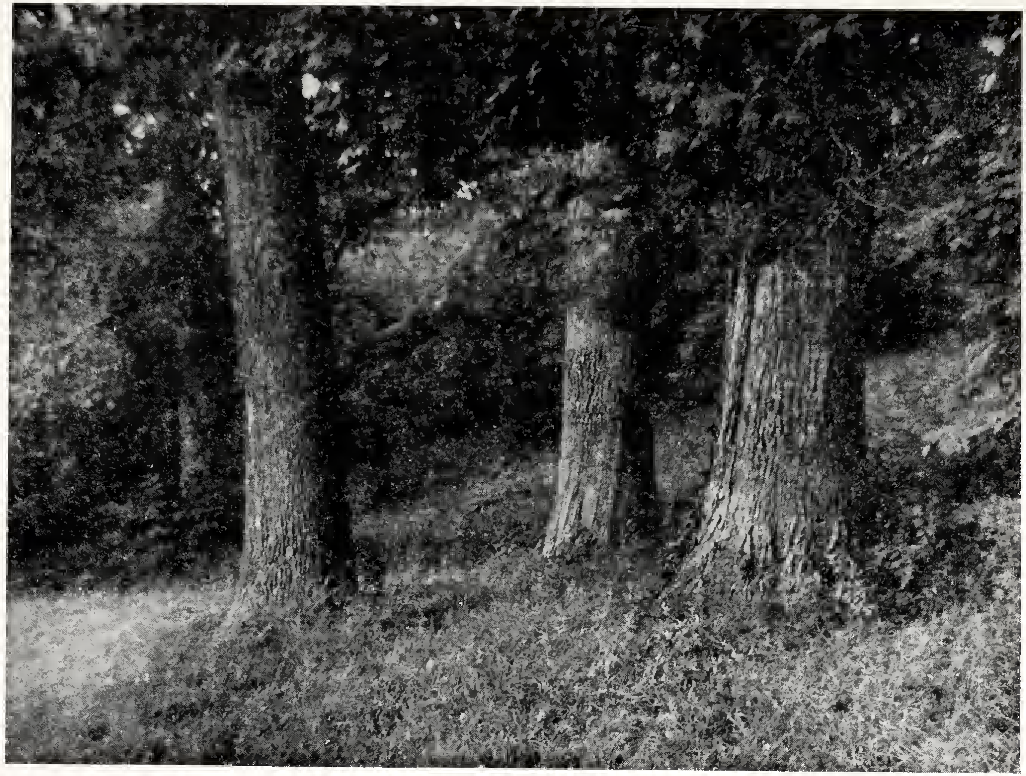
3.—White wax, 120 grains; ether, 1 ounce.

Ground Glass Varnish: Sandarac, 90 grains; mastic, 20 grains; ether, 2 ounces. Dissolve the resins in the ether and add benzole ½ to 1½ ounces.

Lens: to Clean.—The lens should always be kept free from dust or other impurities. To clean it, spread upon a table a clean sheet of paper; take the lens apart, and with a camel-hair brush dust each of the combinations on both sides. If the surfaces of the lenses are very dirty and have lost their polish, make up the following: Nitric acid, 3 drops; alcohol, 1 ounce; distilled water, 2 ounces. Dip a tuft of filtering cotton in this solution, rub each side of the lens, then polish with an absolutely clean chamois. Clean the lens tube before replacing the lenses, each of which should be finally dusted with a camel-hair brush.

Moonlight Effects on Developing Paper (H. S. Hood).—Immerse in water, 5 ounces; ferric ammonium citrate, 12 grains; potassium ferricyanide, 12 grains; nitric acid, 2/5 drams. Prints will assume a blue color. Wash until whites become clear.

Mounting Without Cockling (W. S. Davis).—Coat back of dry print



MONARCHS OF THE FOREST. Warren R. Laity.

with as strong a solution of warm gelatine (pure table gelatine will do) as can be spread easily. Allow to dry, then attach to mount by dampening the mount with water, then lay print in desired position; cover with a sheet of bond or smooth paper, and apply a warm flat iron until the gelatine melts. Very effective for thin mounting material, as there is no cockling if the mount contains just the right amount of water when the iron is applied.

Non-Abrasion Soda Mixture (*M. G. Lovelace*).—Sulphite of soda, 1 ounce; carbonate of soda, 370 grains; hypo, 8 grains. A mixture in these proportions may be used in place of sodas for paper; or carbonate of soda, 28.75 grams; hypo, 38.75 grams; water to 500.00 c.c.

Paste, Starch (*A. Lomax*). Powdered starch, 1 ounce; cold water, 12 ounces. Mix smooth with a glass rod, heat to boiling point. Boil half a minute stirring all the time. Use cold.

Poisons and Antidotes.—Administer the antidote as soon as possible. If a strong acid or alkali, or cyanide of potassium, has been swallowed, lukewarm water in large quantities should be swallowed at once. Where strong acids or alkalies have not been swallowed, rid the stomach of the poison by vomiting; for this purpose take 25 grains of zinc sulphate in warm water.

Polished surfaces: to Photograph.—Smear the surface with soft putty so as to deaden the reflections. Photograph the article against a black background, and stop off all reflections, allowing the light to come from one direction only. To photograph hollow cut glassware fill with ink or aniline black water dye. Before photographing machinery deaden the bright parts with putty.

Safe Light for Panchromatic Plates.—Take old dry plates and coat with the following: Water, 10 ounces; tartrazine, 75 grains; patent blue A, 75 grains; naphthol greens, 75 grains; sulphuric acid, 30 minims. Stain the plates as deeply as possible. Use two plates.

Stains: to Remove from the Hands.—Developer stains: solution of citric or oxalic acid. Silver nitrate stains: Water, 4 ounces; chloride of lime, 350 grains; sulphate of soda, 1 ounce. Apply with a brush.

Tarnished Daguerreotypes, to Restore.—Remove the silvered plate from the case and place it, image uppermost, under a box lid or other protector from dust, etc. Put a small piece of potassium cyanide into a graduate and pour over it 1 or 2 ounces of water. Hold the daguerreotype by the corner with a pair of pliers, rinse it in clear running water, then pour over it the weak cyanide solution (a 3 per cent. solution is usually employed), and return it to the graduate. Repeat this operation several times until the discoloration quite disappears. Wash well in running water, and then, before the surplus water has time to collect in tears upon the image, begin to dry the plate gradually over a spirit lamp, holding the plate in an inclined position so that it will dry from the uppermost corner. The secret of success is in the use of pure water for the final washings and the drying of the image without check or the formation of tears.

Test for Hypo: Potassium permanganate, 2 grains; potassium carbonate, 20 grains; distilled water, 40 ounces. Soak the plate or print to be treated in water for one hour, then remove and add to the water a few drops of the above solution, which will turn a greenish yellow or brown if the water is not free from hypo.

To Flatten Double-weight Prints (*George D. Jopson*).—A—9 ounces boiling water; ½ ounce gelatine. B—3 ounces boiling water; ½ drachm alum. C—2 drachms oil of cloves. Mix and strain through cheese cloth while hot. To use take a little from the stock and place in a cup. Place cup in hot water until backing is dissolved. Apply very thin to back of print with soft cloth or a tuft of cotton.

UNITED STATES WEIGHTS AND MEASURES

According to Existing Standards

LINEAR

12 inches = 1 foot.
3 feet = 1 yard.
5.5 yards = 1 rod.
40 rods = 1 furlong.
8 furlongs = 1 mile.

Inches		Feet		Yards		Rods		Fur's		Mi.
12	=	1								
36	=	3	=	1						
198	=	16.5	=	5.5	=	1				
7,920	=	660	=	220	=	40	=	1		
63,360	=	5,280	=	1,760	=	320	=	8	=	1

SURFACE—LAND

144 sq. ins. = 1 sq. ft.
9 sq. ft. = 1 sq. yd.
30.25 sq. yds. = 1 sq. rod.
40 sq. rods = 1 sq. rood.
4 sq. roods = 1 acre.
640 acres = 1 sq. mile.

Feet		Yards		Rods		Roods		Acres
9	=	1						
272.25	=	30.25	=	1				
10,890	=	1,210	=	40	=	1		
43,560	=	4,840	=	160	=	4	=	1
27,878,400	=	3,097,600	=	102,400	=	2,560	=	640

VOLUME—LIQUID

4 gills = 1 pint.
2 pints = 1 quart.
4 quarts = 1 gallon.

Gills		Pints		Gallon		Cub. In.
32	=	8	=	1	=	231

FLUID

Gallon		Pints		Ounces		Drachms		Minims		Cubic Centimetres
1	=	8	=	128	=	1,024	=	61,440	=	3,785,435
		1	=	16	=	128	=	7,680	=	473,179
				1	=	8	=	480	=	29,574
						1	=	60	=	3,697

16 ounces, or a pint, is sometimes called a fluid pound.

TROY WEIGHT

Pound		Ounces		Pennyweights		Grains		Grams
1	=	12	=	240	=	5,760	=	373.24
		1	=	20	=	480	=	31.10
				1	=	24	=	1.56

APOTHECARIES' WEIGHT

lb. Pound		℥ Ounces		ʒ Drachms		℈ Scruples		gr. Grains		Grams
1	=	12	=	96	=	288	=	5,760	=	373.24
		1	=	8	=	24	=	480	=	31.10
				1	=	3	=	60	=	3.89
						1	=	20	=	1.30
								1	=	.06

The pound, ounce, and grain, are the same as in Troy weight.

AVOIRDUPOIS WEIGHT

Pound		Ounces		Drachms		Grains (Troy)		Grams
1	=	16	=	256	=	7,000	=	453.60
		1	=	16	=	437.5	=	28.35
				1	=	27.34	=	1.77

ENGLISH WEIGHTS AND MEASURES

APOTHECARIES' WEIGHT

20 Grains	=	1 Scruple	=	20 Grains.
3 Scruples	=	1 Drachm	=	60 Grains.
8 Drachms	=	1 Ounce	=	480 Grains.
12 Ounces	=	1 Pound	=	5,760 Grains.

FLUID MEASURE

60 Minims	=	1 Fluid Drachm
8 Drachms	=	1 Fluid Ounce
20 Ounces	=	1 Pint
8 Pints	=	1 Gallon

The above weights are usually adopted in formulas.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT

27 11/32	Grains	=	1 Drachm	=	27 11/32	Grains
16	Drachms	=	1 Ounce	=	437½	Grains
16	Ounces	=	1 Pound	=	7,000	Grains

Precious Metals are usually sold by

TROY WEIGHT

24 Grains	=	1 Pennyweight	=	24 Grains
20 Pennyweights	=	1 Ounce	=	480 Grains
12 Ounces	=	1 Pound	=	5,760 Grains

NOTE.—An ounce of metallic silver contains 480 grains, but an ounce of nitrate of silver contains only 437½ grains.

UNITED STATES FLUID MEASURE

Gal.		Pints.		Ounces.		Drachms.		Mins.		Cub. In.		Grains.		Cub. C.M
1	=	8	=	128	=	1,024	=	61,440	=	231.	=	58,328.886	=	3,785.44
		1	=	16	=	128	=	7,680	=	28.875	=	7,291.1107	=	473.18
				1	=	8	=	480	=	1.8047	=	455.6944	=	29.57
						1	=	60	=	0.2256	=	56.9618	=	3.70

IMPERIAL BRITISH FLUID MEASURE

Gal.		Pints.		Ounces.		Drachms.		Mins.		Cub. In.		Grains.		Cub. C.M.
1	=	8	=	160	=	1,280	=	76,800	=	277.27384	=	70,000	=	4,543.732
		1	=	20	=	160	=	9,600	=	34.65923	=	8,750	=	567.966
				1	=	8	=	480	=	1.73296	=	437.5	=	28.398
						1	=	60	=	0.21662	=	54.69	=	3.550

METRIC SYSTEM OF WEIGHTS AND MEASURES

MEASURES OF LENGTH

Denominations and Values		Equivalents in Use	
Myriameter	10,000 meters.	6.2137	miles.
Kilometer	1,000 meters.	.62137	mile, or 3,280 ft. 10 ins.
Hectometer	100 meters.	328.	feet and 1 inch.
Dekameter	10 meters.	393.7	inches.
Meter	1 meter.	39.37	inches.
Decimeter	1-10th of a meter.	3.937	inches.
Centimeter	1-100th of a meter.	.3937	inch.
Millimeter	1-1000th of a meter.	.0394	inch.

MEASURES OF SURFACE

Denominations and Values		Equivalents in Use	
Hectare	10,000 square meters.	2.471	acres.
Are	100 square meters.	119.6	square yards.
Centare	1 square meter.	1,550.	square inches.

MEASURES OF VOLUME

Denominations and Values			Equivalents in Use			
Names	No. of Liters	Cubic Measures	Dry Measure		Wine Measure	
Kiloliter or stere	1,000	1 cubic meter.	1.308	cubic yards.	264.17	gallons.
Hectoliter	100	1-10th cubic meter.	2	bu. and 3.35 pecks.	26.417	gallons.
Dekaliter	10	10 cubic decimeters.	9.08	quarts.	2.6417	gallons.
Liter	1	1 cubic decimeter.	.908	quart.	1.0567	quarts.
Deciliter	1–10	1-10th cubic decimeter.	6.1023	cubic inches.	.845	gill.
Centiliter	1–100	10 cubic centimeters	.6102	cubic inch.	.338	fluid oz.
Milliliter	1–1000	1 cubic centimeter.	.061	cubic inch.	.27	fl. drm.

WEIGHTS

Denominations and Values			Equivalents in Use	
Names	Number of Grams	Weight of Volume of Water at its Maximum Density	Avoirdupois Weight	
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6	pounds.
Quintal	100,000	1 hectoliter.	220.46	pounds.
Myriagram	10,000	10 liters.	22.046	pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046	pounds.
Hectogram	100	1 deciliter.	3.5274	ounces.
Dekagram	10	10 cubic centimeters.	.3527	ounce.
Gram	1	1 cubic centimeter.	15.432	grains.
Decigram	1–10	1-10th of a cubic centimeter.	1.5432	grain.
Centigram	1–100	10 cubic millimeters.	.1543	grain.
Milligram	1–1000	1 cubic millimeter.	.0154	grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c., is generally used instead of milliliter, and cubic meter instead of kiloliter.

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE

1 cubic centimeter	= 17 minims				
2 cubic centimeters	= 34 "				
3 "	= 51 "				
4 "	= 68 "	or	1 dram	8 minims	
5 "	= 85 "	"	1 "	25 "	
6 "	= 101 "	"	1 "	41 "	
7 "	= 118 "	"	1 "	58 "	
8 "	= 135 "	"	2 drams	15 "	
9 "	= 152 "	"	2 "	32 "	
10 "	= 169 "	"	2 "	49 "	
20 "	= 338 "	"	5 "	38 "	
30 "	= 507 "	"	1 ounce	0 dram	27 minims
40 "	= 676 "	"	1 "	3 drams	16 "
50 "	= 845 "	"	1 "	6 "	5 "
60 "	= 1014 "	"	2 ounces	0 "	54 "
70 "	= 1183 "	"	2 "	3 "	43 "
80 "	= 1352 "	"	2 "	6 "	32 "
90 "	= 1521 "	"	3 "	1 "	21 "
100 "	= 1690 "	"	3 "	4 "	10 "
1000 "	= 1 liter = 34 fluid ounces nearly, or 2⅛ pints.				

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT

The following table, which contains no error greater than one-tenth of a grain, will suffice for most practical purposes:

1 gram	= 15⅖ grains.			
2 grams	= 30⅘ "			
3 "	= 46⅕ "			
4 "	= 61⅘ "	...................or	1 dram	1⅘ grain
5 "	= 77⅕ "	...................."	1 "	17⅕ grains
6 "	= 92⅗ "	...................."	1 "	32⅗ "
7 "	= 108 "	...................."	1 "	48 "
8 "	= 123⅖ "	...................."	2 drams	3⅖ "
9 "	= 138⅘ "	...................."	2 "	18⅘ "
10 "	= 154⅖ "	...................."	2 "	34⅖ "
11 "	= 169⅘ "	...................."	2 "	49⅘ "
12 "	= 185⅕ "	...................."	3 "	5⅕ "
13 "	= 200⅗ "	...................."	3 "	20⅗ "
14 "	= 216 "	...................."	3 "	36 "
15 "	= 231⅖ "	...................."	3 "	51⅖ "
16 "	= 247 "	...................."	4 "	7 "
17 "	= 262⅖ "	...................."	4 "	22⅖ "
18 "	= 277⅘ "	...................."	4 "	37⅘ "
19 "	= 293⅕ "	...................."	4 "	53⅕ "
20 "	= 308⅗ "	...................."	5 "	8⅗ "
30 "	= 463 "	...................."	7 "	43 "
40 "	= 617⅕ "	...................."	10 "	17⅕ "
50 "	= 771⅗ "	...................."	12 "	51⅗ "
60 "	= 926 "	...................."	15 "	26 "
70 "	= 1080⅕ "	...................."	18 "	0⅕ "
80 "	= 1234⅗ "	...................."	20 "	34⅗ "
90 "	= 1389 "	...................."	23 "	9 "
100 "	= 1543⅕ "	...................."	25 "	43⅕ "
1000 "	= 1 kilogram = 32 oz., 1 dr., 12⅖ gr.			

THE ELEMENTS:
THEIR NAMES, SYMBOLS, AND ATOMIC WEIGHTS OXYGEN STANDARD.

Compiled by HENRY F. RAESS.

1915

Aluminum	Al	27.10
Antimony	Sb	120.20
Argon	A	39.88
Arsenic	As	74.96
Barium	Ba	137.37
Bismuth	Bi	208.00
Boron	B	11.00
Bromine	Br	79.92
Cadmium	Cd	112.40
Caesium	Cs	132.81
Calcium	Ca	40.07
Carbon	C	12.00
Cerium	Ce	140.25
Chlorine	Cl	35.46
Chromium	Cr	52.00
Cobalt	Co	58.97
Columbium	Cb	93.50
Copper	Cu	63.57
Dysprosium	Dy	162.50
Erbium	Er	167.70
Europium	Eu	152.00
Fluorine	F	19.00
Gadolinium	Gd	157.30
Gallium	Ga	69.90
Germanium	Ge	72.50
Glucinum	Gl	9.10
Gold	Au	197.20
Helium	He	3.96
Holmium	Ho	163.50
Hydrogen	H	1.008
Indium	In	114.80
Iodine	I	126.92
Iridium	Ir	193.10
Iron	Fe	55.84
Krypton	Kr	82.92
Lanthanum	La	139.00
Lead	Pb	207.10
Lithium	Li	6.94
Lutecium	Lu	174.00
Magnesium	Mg	24.32
Manganese	Mn	54.93
Mercury	Hg	200.60
Molybdenum	Mo	96.00
Neodymium	Nd	144.30
Neon	Ne	20.20
Nickel	Ni	58.68
Niton	Nt	222.40
Nitrogen	N	14.01
Osmium	Os	190.90
Oxygen	O	16.00
Palladium	Pd	106.70
Phosphorus	P	31.04
Platinum	Pt	195.20
Potassium	K	39.10
Praseodymium	Pr	140.60
Radium	Ra	226.40
Rhodium	Rh	102.90
Rubidium	Rb	85.45
Ruthenium	Ru	101.70
Samarium	Sa	150.40
Scandium	Sc	44.10
Selenium	Se	79.20
Silicon	Si	28.30
Silver	Ag	107.88
Sodium	Na	23.00
Strontium	Sr	87.63
Sulphur	S	32.07
Tantalum	Ta	181.50
Tellurium	Te	127.50
Terbium	Tb	159.20
Thallium	Tl	204.00
Thorium	Th	232.40
Thulium	Tm	168.50
Tin	Sn	119.00
Titanium	Ti	48.10
Tungsten	W	184.00
Uranium	U	238.50
Vanadium	V	51.00
Xenon	Xe	130.20
Ytterbium	Yb	173.50
Yttrium	Yt	89.00
Zinc	Zn	65.37
Zirconium	Zr	90.60

TABLE OF COMPARATIVE PLATE SPEED NUMBERS

H & D	Watkins P No.	Wynne F No.	H & D	Watkins P No.	Wynne F No.
10	15	24	220	323	114
20	30	28	240	352	120
40	60	49	260	382	124
80	120	69	280	412	129
100	147	77	300	441	134
120	176	84	320	470	138
140	206	91	340	500	142
160	235	103	380	558	150
200	294	109	400	588	154

The above Watkins and Wynne numbers are equivalent to the H and D, only when the latter is determined in accordance with the directions of Hurter and Driffield, that is with pyro-soda developer and using the straight portion only of the density curve.

To convert H and D into Watkins: Multiply H and D by 50 and divide by 34. For all practical purposes the Watkins P number is 1½ times H and D.

To convert Watkins into Wynne F Nos.: Extract the square root and multiply by 6.4.

The above methods have been approved by the Watkins Meter Company and the Infallible Exposure Meter Company.

TABLE OF SOLUBILITIES OF THE MORE COMMON CHEMICALS USED IN PHOTOGRAPHY

Sol.—Soluble. V.S.—Very Soluble. S.S.—Slightly Soluble. Dec.—Decomposed. Insol.—Insoluble.

	One Part is Soluble in—Parts of Water	
	Cold	Hot
Acetone, Sulphite	1	..
Acid, Citric	0.75	0.50
Acid, Gallic	100	0.3
Acid, Oxalic	9	0.3
Acid, Pyrogallic	2	V.S.
Acid, Tannic	0.6	..
Acid, Tartaric	0 75	.5
Alum	8	.25
Alum, Chrome	6	Dec.
Aluminum, Chloride	0.25	V.S.
Amidol	4	V.S.
Ammonium, Bichromate	5	.25
Ammonium, Bromide	1.3	0.7
Ammonium, Carbonate	4	Dec.
Ammonium, Citrate	0.5	V.S.
Ammonium, Iodide	0.75	V.S.
Ammonium, Nitrate	1	V.S.
Ammonium, Persulphate	1.5	Dec.
Ammonium, Sulphocyanide	0.6	V.S.
Borax	12.5	2
Cadmium, Bromide	1	V.S.
Cadmium, Chloride	0.7	V.S.
Cadmium, Iodide	1	.75
Caustic Potash—Pot. Hydrate	0.5	.25
Caustic Soda—Soda Hydrate	1.5	.5
Copper, Chloride	1	.75
Copper, Sulphate	3	1
Edinol	1	5
Gold, Chloride	V.S.	V.S.
Hydroquinone	17	..
Ferric, Chloride	0.75	.5
Ferric, Amm. Citrate	4	..
Ferric, Potassium Oxalate	15	0.85
Ferric, Sodium Oxalate	1.69	0.55
Ferrous, Sulphate	1.5	.05
Ferrous, Oxalate	Insol.	..
Lead, Acetate	2	1
Lead, Nitrate	2	.7
Mercury, Bichloride	18	2
Metol	Sol.	..
Ortol	Sol.	..

	One Part is Soluble in—Parts of Water	
	Cold	Hot
Potassium, Bicarbonate	3.5	Dec.
Potassium, Bichromate	10	1
Potassium, Bromide	1.5	1
Potassium, Carbonate	.9	0.50
Potassium, Chloroplatinite	6	V.S.
Potassium, Cyanide	1	0.5
Potassium, Ferricyanide	2.5	1.3
Potassium, Ferrocyanide	3	1.5
Potassium, Iodide	0.75	0.5
Potassium, Metabisulphite	Sol.	Dec.
Potassium, Oxalate	3	2
Potassium, Permanganate	16	10
Potassium, Persulphate	50	Dec.
Potassium, Sulphocyanide	1	0.5
Pyrocatechin	1.25	V.S.
Rochelle Salt	1.5	V.S.
Silver, Nitrate	.75	.25
Sodium, Acetate	3	.5
Sodium, Bicarbonate	12	Dec.
Sodium, Bisulphite	V.S.	..
Sodium, Bromide	1.25	1
Sodium, Carbonate (dry)	6	2.2
Sodium, Carbonate (crys't)	1.5	V.S.
Sodium, Chloride	3	2.5
Sodium, Citrate	1	.5
Sodium, Hyposulphite	1.5	1
Sodium, Iodide	.5	.3
Sodium, Phosphate	6.7	1
Sodium, Sulphide	V.S.	V.S.
Sodium, Sulphite (dry)	4	2
Sodium, Sulphite (crys't)	2.2	1
Sodium, Tungstate	8–12	S.
Uranium, Chloride	V.S.	V.S.
Uranium, Nitrate	.5	.25
Uranium, Sulphate	.5	.25

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$

In the following table Mr. S. A. Warburton calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	*f*	U. S. No.	*f*	U. S. No.
1	1/16	15	14.06	58	210.25
1¼	.097	16	16	59	217.56
1.414	⅛	17	18.06	60	225.00
1½	.140	18	20.25	61	232.56
1¾	.191	19	22.56	62	240.25
2	¼	20	25.00	63	248.06
2¼	.316	21	27.56	64	256
2½	.390	22	30.25	65	264.06
2.828	½	22.62	32	66	272.25
2¾	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
3¼	.660	25	39.06	69	297.56
3½	.765	26	42.25	70	306.25
3¾	.878	27	45.56	71	15.06
4	1	28	49.00	72	324.00
4¼	1.12	29	52.56	73	333.06
4½	1.26	30	56.25	74	342.25
4¾	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
5¼	1.72	33	68.06	77	370.56
5½	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
5¾	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
6¼	2.44	38	90.25	82	420.25
6½	2.64	39	95.06	83	430.56
6¾	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
7¼	3.28	42	110.25	86	462.25
7½	3.51	43	115.56	87	473.06
7¾	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
8¼	4.25	45.25	128	90	506.25
8½	4.51	46	132.25	90.50	512
8¾	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
9¼	5.34	49	150.06	93	540.56
9½	5.64	50	156.25	94	552.25
9¾	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625
14	12.25	57	203.06		

HEART OF THE ADIRONDACKS. Wm. T. Knox.

THE REFLECTING POWER OF VARIOUS SURFACES ACCORDING TO MAX FRANK

Translated by Henry F. Raess

Mirror	0.923
Freshly fallen snow	0.783
White paper	0.700
Light orange paper	0.548
Light green paper	0.465
Light yellow paper	0.400
Light blue paper	0.300
White sandstone	0.237
Dark yellow	0.200
The moon	0.170
Light red	0.162
Dark green	0.101
Dark earth	0.079
Dark blue	0.065
Black paper	0.045
Black cloth	0.012
Black velvet	0.004

STRENGTH OF VARIOUS LIGHTS, ACCORDING TO EDER COMPILED BY HENRY F. RAESS

Sun at zenith	100.000–160.000
Flaming arc light	2000–3000
Electric arc light	400–1000 and higher
Nernst projection lamp, 220 volts	1000
" " " 110 "	500
Mercury vapor lamp	300–400
Electric incandescent light, metallic filament	25–50
Electric incandescent light, carbon filament	8–32 and higher
Magnesium ribbon burning 0.0074 gm. (about 1-10 grain) per second	125
Calcium light, low pressure	23–90
" " high " 52 lbs	790
Acetylene gas light	60–100
" " " with compressed air	100–400
Incandescent gas light	60–85
" " " with compressed air	100–400
Gas flame, argand burner	16–20
" " fish tail jet	6–10
Oil lamp	10–11
" " with oxygen	60
Petroleum lamp, round burner, 25 m-m (1 in.) diam	14
Petroleum lamp, round burner, 15 m-m (about 1-2 in.) diam	6.5
Petroleum lamp, flat burner	5–7
Normal paraffine candle	1
Tallow candle	0.7–0.9
Full moon	0.333–0.166

TABLE FOR CALCULATING DISTANCES IN ENLARGING OR REDUCING

From The British Journal Photographic 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 2/3	10 2 1/2	12 2 2/5	14 2 1/3	16 2 2/7	18 2 1/4
2 1/2	5 5	7 1/2 3 3/4	10 3 1/3	12 1/2 3 1/8	15 3	17 1/2 2 9/10	20 2 6/7	22 1/2 2 3/16
3	6 6	9 4 1/2	12 4	15 3 3/4	18 3 3/5	21 3 1/2	24 3 3/7	27 3 3/8
3 1/2	7 7	10 1/2 5 1/4	14 4 2/3	17 1/2 4 3/4	21 4 1/5	24 1/2 4 1/12	28 4	31 1/2 3 9/10
4	8 8	12 6	16 5 1/3	20 5	24 4 4/5	28 4 2/3	32 4 4/7	36 4 1/2
4 1/2	9 9	13 1/2 6 3/4	18 6	22 1/2 5 3/5	27 5 2/5	31 1/2 5 1/4	36 5 1/7	40 1/2 5 1/16
5	10 10	15 7 1/2	20 6 2/3	25 6 1/4	30 6	35 5 5/6	40 5 5/7	45 5 5/8
5 1/2	11 11	16 1/2 8 1/4	22 7 1/3	27 1/2 6 4/5	33 6 1/2	38 1/2 6 5/12	44 6 2/7	49 1/2 6 3/16
6	12 12	18 9	24 8	30 7 1/2	36 7 1/5	42 7	48 6 6/7	54 6 3/4
7	14 14	21 10 1/2	28 9 1/3	35 8 3/4	42 8 2/5	49 8 1/6	56 8	63 7 7/8
8	16 16	24 12	32 10 2/3	40 10	48 9 3/5	56 9 1/3	64 9 1/7	72 9
9	18 18	27 13 1/2	36 12	45 11 1/4	54 10 4/5	63 10 1/2	72 10 2/7	81 10 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 center. 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 6 inches equivalent focus. He must therefore look for 4 on the upper horizontal line and for 6 on the first vertical column and carry his eye to where these two join, which will be 30-7½. The greater of these is the distance the sensitive plate must be from the center 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 12 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.

TABLES OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS WHEN SHARP FOCUS IS SECURED ON INFINITY

Focal Length of Lens in Inches	Ratio marked on Stops													
	f/4	f/5.6	f/6	f/7	f/8	f/10	f/11	f/15	f/16	f/20	f/22	f/32	f/44	f/6
	Number of feet after which all is in focus													
4	33	24	22	19	17	13	12	9	8	7	6	4	3	2
4¼	38	27	25	21	19	15	14	10	10	7	7	5	3½	2½
4½	42	30	28	24	21	17	15	11	11	8½	7½	5½	4	3
4¾	47	34	31	27	24	19	17	12	12	9½	8½	6	5	3
5	52	36	35	30	26	21	19	14	13	10½	9½	6½	5½	3½
5¼	57	40	38	33	28	23	21	15	14	11½	10½	7	5½	3½
5½	63	45	43	36	31	25	23	17	15	12½	11½	7½	6	4
5¾	68	50	46	38	34	27	25	18	17	13½	13	8½	6½	4
6	75	54	50	42	38	30	28	20	19	15	14	9	7	4½
6¼	81	58	54	46	40	32	29	22	20	16	15	10	7½	5
6½	87	62	58	50	44	35	32	23	22	17½	16	11	8	5½
6¾	94	67	63	54	47	38	34	25	24	19	17	12	8½	6
7	101	72	68	58	51	40	37	27	25	20	18	12½	9	6
7¼	109	78	73	62	54	44	39	29	27	22	20	13½	10	6½
7½	117	83	78	64	58	47	42	31	29	24	21	14½	10½	7
7¾	124	90	83	71	62	50	45	33	31	25	22	15½	11	7½
8	132	96	88	76	68	52	48	36	32	28	24	16	12	8
8¼	141	100	94	80	71	56	51	37	35	29	25	17½	12½	8½
8½	150	104	100	84	76	60	56	40	38	30	27	19	13½	9
8¾	156	111	104	89	78	63	57	42	39	32	29	20	14	10
9	168	120	112	96	84	67	61	45	42	34	31	21	15	10½
9¼	180	127	116	101	90	71	65	47	45	35	32	22	16	11
9½	190	133	125	107	95	75	68	50	47	37	34	24	17	12
9¾	197	141	131	113	99	79	72	52	50	39	36	25	18	12½
10	208	148	140	120	104	83	75	55	52	42	38	26	19	13

If sharp focus is secured on any of the distances shown, then, with the stop indicated all objects are in focus from half the distance focused on up to infinity.

LENGTH OF STUDIO

REQUIRED FOR LENSES OF DIFFERENT FOCAL LENGTHS FROM 6 TO 8 FEET IS ALLOWED FOR THE CAMERA AND OPERATOR

From "Photographic Lenses" by BECK and ANDREWS

Focus of Lens	Size	Kind of Portrait	Length of Studio	Dist. of Lens from Object
Inches			In Feet	In Feet
6	Carte de Visite 3¼x4¼	Full Length	18 to 20	11 to 12
7½	Carte de Visite	Full Length	22 to 25	14 to 15
8½	Carte de Visite	Full Length	24 to 28	17 to 19
		Bust	10 to 15	5
9½	Cabinet and smaller groups	Full Length	20 to 23	12 to 13
		Bust	12 to 17	7
11	Cabinet and 5x7 groups	Full Length	25 to 30	17 to 18
		Bust	13 to 20	8
14½	Cabinets, panels and 6½x8½ groups	Full Length	32 to 40	23 to 24
		Bust	14 to 20	7
19	10x12 portraits or groups	Full Length	20 to 25	13
		Bust	14 to 20	7
24	16x20 portraits or groups	Full Length	25 to 30	14
		Bust	14 to 20	8

American Photographic Societies

This list is compiled from information received from an inquiry form sent to the societies during the latter half of 1915. It includes many societies not given in the 1915 list, but falls short of completeness as a record of the photographic societies of America. Secretaries of societies not here listed are urged to send us particulars of their organization so that the list may be fully representative of society activities.—Editor.

AKRON CAMERA CLUB—Akron, Ohio. Headquarters, Y. M. C. A. Building, Established 1890. Membership, 50. Date of meetings, second and fourth Wednesday of each month. *President,* H. A. Hoffman; *Secretary,* Louis D. Allen, 878 N. Market Street. Date of annual exhibition, February.

AMERICAN INSTITUTE PHOTOGRAPHIC SECTION—New York City. Headquarters, 322-324 West 23d Street. Established March 26, 1859. Stated meetings, first and third Mondays of each month. No meetings during Summer months. *Chairman,* Oscar G. Mason; *Vice-Chairman,* Robert A. B. Dayton; *Treasurer,* James Y. Watkins; *Secretary,* John W. Bartlett, M.D., F.R.P.S., 149 West 94th Street.

AMERICAN LANTERN SLIDE INTERCHANGE—New York. Principal office, 233 Broadway. Organized 1885. *General Manager,* F. C. Beach. Membership, 20 clubs. *Board of Managers,* F. C. Beach, New York; H. W. Schonewolf, Buffalo, N. Y.; O. C. Reiter, Pittsburg, Pa.; W. G. Barnes, Orange, N. J.; W. H. Rau, Philadelphia, Pa. Annual meeting, January of each year.

BALTIMORE CAMERA CLUB, INC.—Headquarters, 1121 Bolton Street, Baltimore, Md. Organized in April, 1912. *President.* J. E. Orrison, M.D.; *Vice-President,* John P. Jones; *Secretary,* C. J. Rodgers; *Treasurer,* Joseph B. Legg. Meeting every Tuesday night.

BERKSHIRE CAMERA CLUB—Pittsfield, Mass. Membership, 25. Annual exhibition in May. *Honorary Chairman,* Edwin Hale Lincoln, P. O. Box, Pittsfield, Mass.; *Chairman,* F. D. Burt, 80 Edward Avenue, Pittsfield, Mass.

BOSTON PHOTO CLAN—Organized July, 1911. Headquarters, The Garo Studio, 739 Boylston Street. Membership, 9. *Secretary,* Dr. Malcolm Dean Miller, 274 Beale Street, Wollaston, Mass.

BOSTON CAMERA CLUB—Boston, Mass. Established 1881. Incorporated 1886. Membership, 75. *President,* P. Hubbard; *Secretary,* John H. Thurston, 50 Bromfield Street.

BOSTON YOUNG MEN'S CHRISTIAN UNION CAMERA CLUB—Boston, Mass. Headquarters, 48 Boylston Street, Boston. Organized 1908. *President,* Howard I. Saunders; *Vice-President,* Henry C. Shaw; *Treasurer,* H. C. Channen; *Secretary,* Louis Astrella. Meetings first Tuesday each month at club rooms, 48 Boylston Street.

BRITISH COLUMBIA AMATEUR PHOTOGRAPHIC SOCIETY—Orpheum Building, Vancouver, Canada. Organized May 1, 1914. *Chairman Board of Trustees,* C. F. Bollschweiler; *Secretary-Treasurer,* C. James Duncan, Meetings, second Thursday of each month.

BUFFALO CAMERA CLUB—Buffalo, N. Y. Headquarters, Kinne Building, corner Main and Utica Streets. Annual election of officers, fourth Thursday in April; regular meeting nights, second and fourth Thursdays of each month. *President,* Hugh Kerr Thomas; *Vice-President,* Emil Strub; *Secretary,* Ward L. Conklin, 49 Niagara Street.

CALIFORNIA CAMERA CLUB—San Francisco, Cal. Headquarters, 833 Market Street, San Francisco. Established March 18, 1890. Incorporated April 5, 1890. Membership, 370. Date of meeting, second Tuesday, monthly. Date of annual exhibition, no set time. *President,* Percy Neymann, Ph.D.; *Secretary,* Clifford B. Rushmer.

CAMERA CLUB—New York. Headquarters, 121 West 68th Street. Established by consolidation of Society of Amateur Photographers and New York Camera Club in April, 1896. Incorporated May 7, 1896. Membership, 200. Date of annual meeting, first Thursday after the first Monday in January. *Secretary,* Monroe W. Tingley.

CAMERA CLUB OF CINCINNATI—Cincinnati, Ohio. Headquarters, Seventh and Walnut Streets. Established February 26, 1913. Date of meetings, 1st and 16th of each month, except when said dates fall on Sunday; then on the following Monday. *President,* Charles H. Partington; *Secretary and Treasurer,* G. A. Ginter.

CAMERA CLUB OF HARTFORD—Hartford, Conn. Membership, 15. *President,* Dr. Frederic S. Crossfield, 75 Pratt Street; *Vice-President,* Clayton P. Chamberlain; *Corresponding Secretary,* Eugene D. Field; *Treasurer,* A. L. Chase; *Secretary,* Mr. Charles R. Nason, 20 Madison Street.

CAMERA CLUB OF THE TWENTY-THIRD STREET BRANCH, Y. M. C. A.—New York. Headquarters, 23d Street Y. M. C. A. Established June 3, 1904. Membership, 65. Date of business meetings, second Tuesday in each month. *President,* William J. Guy; *Secretary,* Oscar L. Ellison, 215 West 23d Street; *Treasurer,* A. Andrew Sellner. Date of annual exhibition, New Year's Day.

"CAMERADS"—New Brunswick, N. J. Headquarters, corner Church and George Streets. Established April 24, 1890. *Secretary,* Harvey Iredell, D.D.S., Lock Box 34, New Brunswick.

CAMERA CRAFT CLUB—Steubenville, Ohio. Established March 28, 1913. Regular meetings, last Friday of each month. *President,* Miss Elinor J. Neidengard; *Vice-President,* Miss Margaret E. Fisher; *Secretary and Treasurer,* Charles E. McKee, 1011 Wilson Avenue.

CAMERA CRAFTSMEN—*Director,* Roy C. Burckes, 249 School Street, Winter Hill, Mass.

CAMERA PICTORIALISTS OF LOS ANGELES—Los Angeles, Cal. Headquarters, 758 P. E. Building. Association formed for strictly pictorial work. *Director,* Louis Fleckenstein; *Correspondent,* A. S. Little.

CAPITAL CAMERA CLUB, INC.—Washington, D. C., 712 11th Street, N. W. Founded May 1, 1891. Annual meeting, third Thursday in May. *President,* George H. Macdonald; *Vice-President,* Charles A. Baker; *Secretary,* Rutland D. Beard; *Treasurer,* N. G. Watts; *Librarian,* Mrs. W. B. McDevitt. Date of annual exhibition, May.

CHICAGO CAMERA CLUB—Chicago, Ill. Headquarters, 329 Plymouth Court. Established February 14, 1904. Incorporated February 19, 1904. Date of meetings, every Thursday. *President,* Jos. Simons; *Vice-President,* F. T. Farrell; *Secretary,* H. P. Parker, 329 Plymouth Court.

CHICAGO PHOTO FELLOWS—Chicago, Ill. Organized September 8, 1909. Membership, 8. *Correspondent,* F. M. Tuckerman, 1109 Railway Exchange, Chicago.

CITY HALL CAMERA CLUB—Los Angeles, Cal. Headquarters, Room 505 Hosfield Building. Organized May 25, 1914. Membership, 24. *Correspondent,* W. C. Sawyer.

CLEVELAND PHOTOGRAPHIC SOCIETY—Cleveland, Ohio, 412 Superior Avenue, N. W. Established June 7, 1913. Permanent organization effected at meeting of June 18. Meetings, every Wednesday. *Chairman,* Dr. H. B. Van Tress; *Secretary-Treasurer,* A. R. Webber.

COLUMBIA PHOTOGRAPHIC SOCIETY—Philadelphia, Pa. Headquarters, 2526 North Broad Street, Philadelphia. Established 1889. Incorporated July 3, 1894. Membership, 75. Date of meetings, first Monday of each month, business meeting; other Mondays, lectures or demonstrations. *President,* J. C. Haas; *Vice-President,* C. F. Davis; *Secretary,* H. E. Abbott; *Treasurer,* H. W. Pfizenmaier, 2325 N. 17th Street.

DUNKIRK RADIO AND CAMERA CLUB—Dunkirk, N. Y. Amateur Photographers and Amateur Wireless Operators eligible. *President,* John H. Clarke; *Secretary,* Francis X. Dotterweich, 523 Dove Street.

DAGUERRE CAMERA CLUB—Headquarters, Harbert, Mich. Established 1893. Membership, 20. Date of meetings, first Monday of each month. *President,* F. Blish; *Secretary,* Wells Sizer, Harbert.

ELMIRA CAMERA CLUB—Elmira, N. Y. Headquarters, 116 Baldwin Street, Elmira. Established 1902. Membership, 30. *President,* E. B. Sheely; *Secretary-Treasurer,* Seely Stage, 706 Columbia Street.

ELYSIAN CAMERA CLUB—Hoboken, N. J. Headquarters, 307 Washington Street. Established 1902. Date of meetings, second Friday of each month. Membership, 50. *President,* Martin S. Crane; *Vice-President,* Adolph Geiger; *Treasurer,* Julius Nelson; *Secretary,* William F. Nelson, 590 Boulevard East, Weehawken, N. J.

ESSEX CAMERA CLUB—Newark, N. J. Headquarters, 872 Broad Street, Newark, N. J. Organized July, 1899. Membership, 40. Date of meetings, fourth Tuesday of every month. *President,* George A. Hardy; *Secretary,* L. F. Gebhardt, South 11th Street.

GRAND RAPIDS CAMERA CLUB—Grand Rapids, Mich. Headquarters, 2 Central Place, N. E. Established 1899. Meetings every Thursday evening from September to June. *President,* Dr. Rawson; *Vice-President,* John L. Benjamin; *Treasurer,* Harvey E. Barnes; *Secretary,* Harriet M. Goodrich, 143 Waverly Avenue, Grand Rapids, Mich.

INTERNATIONAL PHOTOGRAPHIC ASSOCIATION—San Francisco, Cal. Founded 1908. *President,* F. B. Hinman, Room 4, Union Depot, Denver, Col.; *Chief Album Director,* J. H. Winchell, R. F. D. No. 2, Painesville, Ohio; *General Secretary,* Fayette J. Clute, 413-415 Claus Spreckels Building, San Francisco; *Stereoscopic Album Director,* James B. Warner, 413-415 Claus Spreckels Building, San Francisco, Cal.; *Director Post Card Division,* Charles M. Smythe, 1160 Detroit Street, Denver, Col.; *Director Lantern-Slide Division,* George E. Moulthrope, Bristol, Conn.; *Secretary Lantern-Slide Division,* Edward F. Cowles, 11 Oak Street, Bristol, Conn. The *State Secretaries, Alabama*—Richard Hines, Jr., Barton Academy Building, Mobile. Alaska—P. S. Hunt, Valdez. California—W. E. Thomson, 3211 School Street, Fruitvale, Cal. Colorado—O. E. Aultman, 106 East Main Street, Trinidad. Connecticut—George E. Moulthrope, Bristol. Florida—Capt. E. S. Coutant, Box 73, Stuart. Georgia—L. O. Surles, 231 East Pine Street, Atlanta. Idaho—Eugene Clifford, Weippe. Illinois—George A. Price, 802 West Park Street, Urbana. Indiana—H. E. Bishop, 1706 College Avenue, Indianapolis. Iowa—C. E. Moore, Knoxville. Kansas—H. E. High, Box 72, Elsworth. Maryland—E. G. Hopper, 218 East 20th Street, Baltimore. Massachusetts—John Mardon, 161 Summer Street, Boston. Michigan—W. E. Ziegenfuss, M.D., 327 West Hancock Avenue, Detroit. Minnesota—Leonard A. Williams, St. Cloud. Mississippi—George W. Askew, Jr., 211 34th Avenue, Meridan. Missouri—Wharton Schooler, R. F. D. No. 2, Eolia. Nebraska—Miss Lou P. Tillotson, 1305 South 32d Street, Omaha. New Hampshire—Mrs. A. Leonora Kellogg, 338 McGregor Street, Manchester. New York—Charles F. Rice, P. O. Box 517, Mamaroneck. New Jersey—Burton H. Albee, 103 Union Street, Hackensack. North Dakota—Jas. A. Van Kleeck, 619 Second Avenue, North Fargo. Ohio—J. H. Winchell, R. F. D. No. 2, Painesville. Pennsylvania—L. A. Sueary, 2822 Espy Avenue, Pittsburg. South Dakota—C. B. Bolles, L. B., 351, Aberdeen. Texas—J. B. Oheim, P. O. Drawer M, Henrietta. Utah—John C. Swenson, A.B., Provo. West Virginia—William E. Monroe, Box 298, Point Pleasant.

INTER-CITY CAMERA CLUB PRINT EXCHANGE—Headquarters, Portland, Me. Membership, 8 cities. *Chairman,* Carl A. Jordan, 7 Wilney Avenue, Portland, Me.

JAMESTOWN CAMERA CLUB—Jamestown, N. Y. Established 1907. Headquarters, Chadakoin Building, Jamestown, N. Y. Membership, 18. Meetings, second Tuesday of month. *President,* C. O. Hultgren; *Vice-President,* C. Southwick; *Treasurer,* E. H. Sample; *Secretary,* L. Miller, 108 Buffalo Street.

KANSAS CITY CAMERA CLUB—Kansas City, Mo. *President,* N. J. Simonds; *Vice-President,* Val B. Mintun; *Secretary-Treasurer,* Dr. Maclay Lyon, Suite 501 Bryant Building. Club meets second Thursday of each month. Annual exhibition in October.

LANTERN AND LENS GILD OF WOMEN PHOTOGRAPHERS—Headquarters, 10 South 18th Street, Philadelphia, Pa. Established 1909. Membership, 46. Meetings, every Wednesday. *Dean of Gild,* Miss E. W. Fisher; *Deans,* Mrs. Walter Murphy, Miss M. L. Bodine; *Steward,* Miss M. W. Little; *Clerk of Records,* Mrs. H. W. Withington; *Clerk,* Mrs. M. W. Wiltse.

LOS ANGELES PHOTOGRAPHIC CLUB—Los Angeles, Cal. Studio, darkrooms, exhibition gallery, etc., occupies entire top floor Lyceum Building. Organized May 20, 1915. Club meets every Thursday, 8 p. m. *President,* T. K. Adlard; *Vice-President,* C. T. Dodds; *Treasurer,* C. L. Hogan; *Secretary,* Hal G. Hall, Station "C," Box 104.

MISSOURI CAMERA CLUB—St. Louis, Mo. Club Rooms, 5033 Delmar Avenue. Organized November, 1903. Meetings, second and fourth Tuesday. *President,* W. C. Crouse; *Treasurer,* M. Hollingshead; *Acting Secretary,* Clarence Welsh, 5033*a* Delmar Avenue, care of Mo. Camera Club.

MONTREAL AMATEUR ATHLETIC ASSOCIATION CAMERA CLUB—Montreal, Canada. Headquarters, M. A. A. A. Building, 250 Peel Street. Organized May 1, 1906. *President,* Gordon K. Miller; *Vice-President,* P. F. Calcutt; *Treasurer,* R. E. Melville; *Secretary,* E. W. de Cordova, 603 Shaughnessy Building, Montreal.

NEWARK CAMERA CLUB—59 Mechanic Street, Newark, N. J. Organized 1888. Incorporated 1910. *President,* Lysander E. Wright; *Vice-President,* Robert B. M. Taylor; *Treasurer,* L. Wright, Jr.; *Secretary,* Benj. C. Mott. Membership, 90. Meetings, second and fourth Mondays in each month.

NEW BRITAIN CAMERA CLUB—Organized 1892. *President,* E. H. Start; *Vice-President,* John A. Lewis; *Secretary and Treasurer,* Paul A. Stahl, 104 So. Burritt Street, New Britain, Conn. Meets second and fourth Tuesdays, 173 Main Street.

NEW HAVEN CAMERA CLUB—739 Chapel Street. Organized 1911. Membership, 70. *President*, Charles T. Maloney; *Vice-President*, J. M. Walton; *Secretary*, George Kissell; *Treasurer*, H. D. Vincent. Meetings held every Thursday. Business meetings, first Thursday in the month.

ORANGE CAMERA CLUB—Orange, N. J. Headquarters, 222 Main Street. Established March 21, 1892. Incorporated May 19, 1893. Membership, 100. Date of meetings, first and third Saturdays of each month, except July, August and September. *President*, Stephen S. Johnson; *Secretary*, Lindley W. Bode, 222 Main Street, Orange, N. J.

OREGON CAMERA CLUB—Portland, Ore., 51 Washington Building. Established 1895. Incorporated 1903. Membership, 150. Date of meetings, second Tuesday in January. *President*, C. F. Richardson; *Vice-President*, J. A. Leas; *Secretary-Treasurer*, J. J. Tyrrell. Date of annual exhibition, early spring.

PHOTOGRAPHIC CLUB OF BALTIMORE CITY—Baltimore, Md. Headquarters, Maryland Academy of Sciences Building, 105 West Franklin Street. Established 1885. Incorporated 1890. Membership, active, 71. Date of meetings, every Tuesday. *President*, Lloyd D. Norris; *Secretary*, Norman E. Horn. Date of annual exhibition, March.

PHOTO FELLOWS OF THE WORLD—*Dean*, Sigismund Blumann, 3217 Davis Street, Fruitvale, Cal.

PHOTOGRAPHIC SOCIETY OF PHILADELPHIA—Philadelphia, Pa. Headquarters, 1615-1617 Sansom Street. Established November, 1862. Incorporated April 24, 1885. Membership, 130. Date of meetings: Members, second Wednesday; visitors, third Wednesday. *President*, Henry P. Baily; *Secretary*, Harold F. A. Starr, 1615 Sansom Street. Date of members' annual exhibition, February. Members annual exhibit vacation work, in all media—November.

PHOTO-PICTORIALISTS OF BUFFALO—Buffalo, N. Y. Organized October, 1906. Meetings semi-monthly. *Correspondent*, W. H. Porterfield, 100 Lakeview Avenue.

PHOTO SECESSION—New York, N. Y. Headquarters and Galleries, 291 Fifth Avenue. Continuous exhibitions November-April, also galleries at 500 Fifth Avenue, exhibitions all year. *Director*, Alfred Stieglitz.

PITTSBURGH-ACADEMY OF SCIENCE AND ART (PHOTOGRAPHIC SECTION)—Pittsburgh, Pa. Headquarters, Carnegie Institute, Schenley Park. Organized January 23, 1900. Membership, 100. Meetings, second and fourth Tuesdays of each month at Carnegie Institute. *President*, O. C. Reiter, 2424 Penn Avenue; *Vice-President*, Rev. David R. Breed; *Secretary-Treasurer*, C. E. Beeson, 19th floor, Frick Building, Pittsburgh, Pa.; *Lantern-Slide Director*, W. A. Dick, 910 Chislett Street; *Print Director*, S. A. Martin, 923 Chislett Street. Annual salon, Carnegie Art Gallery, March.

PITTSBURGH CAMERA CLUB—Pittsburgh, Pa. Established December, 1910. Membership, 35. *President*, Robert L. Sleeth, Jr.; *Treasurer*, William McK. Ewart, 2524 Center Avenue; *Secretary*, Charles W. Doutt, Crafton, Pa.

PORTLAND CAMERA CLUB PHOTOGRAPHIC SECTION OF THE PORTLAND SOCIETY OF ART—Portland, Me. Headquarters, L. D. M. Sweat Memorial, Spring, corner High Street. Established 1899. Membership, 90. Date of meetings, every Monday evening. *President*, Henry A. Peabody; *Vice-President*, George E. Fogg; *Secretary*, E. Roy Monroe. Date of annual exhibition, in March.

POSTAL PHOTOGRAPHIC CLUB—Headquarters, Washington, D. C. Established December, 1888. Membership, 40. Date of meetings, no regular meeting. *President*, Charles E. Fairman; *Secretary*, Gustavus A. Brandt, 631 Maryland Avenue, S. W., Washington, D. C. Albums circulate among members monthly, except August and September.

PROVIDENCE CAMERA CLUB—Providence, R. I. Established 1883. Incorporated 1889. Headquarters, Commercial Building, 55 Eddy Street. Total membership, 100. Date of meetings, second Saturday of each month. *President*, H. Ladd Walford; *Vice-President*, Ernest F. Salisbury; *Secretary*, C. W. Morrill, 55 Eddy Street; *Treasurer*, G. Frederick Bohl.

ROCHESTER CAMERA CLUB—Rochester, N. Y. Headquarters, 123 West Main Street. *Board of Trustees—Chairman*, Jas. A. Kipp, Arthur Wygant, E. Shantz, W. J. Reddin; *Secretary-Treasurer*, Edw. A. Carroll, 417 Monroe Avenue, Rochester, N. Y.

SPRINGFIELD PHOTOGRAPHIC SOCIETY—Springfield, Mass. Meets in Central High School the first and third Wednesdays of every month except July and August. *President*, Dr. Albert J. Treichler; *Vice-President*, Arthur P. Irving; *Secretary*, P. M. Tainter, 254 Orange Street; *Treasurer*, Mrs. K. A. Burdette; *Custodian*, Charles D. Todd; *Chairman of Executive Committee*, Fred A. Hoschke.

ST. LAWRENCE CAMERA CLUB—Ogdensburg, N. Y. Headquarters, 74 Caroline Street. Established 1900. Membership, 8. Date of meetings, at the call of the Secretary. *President*, Arthur L. Jameson; *Secretary*, John N. Brown, 74 Caroline Street.

ST. LOUIS CAMERA CLUB—St. Louis, Mo. Organized February 12, 1914. Devoted to the interest and advancement of the art of photography. Meetings every second and fourth Thursday at 8 p. m.; Central Public Library, 13th and Oliver Streets. *President,* Oscar C. Kuehn; *Vice-President,* Hector Updike; *Secretary,* Alvin W. Prasse, 3149 Shenandoah Avenue.

TOLEDO CAMERA CLUB—Toledo, Ohio. Member of the American Federation. Headquarters, Museum of Art. Meets second Wednesday of month. *President,* John T. Murphy; *Vice-President,* Dan Dorcy; *Secretary,* Harry A. Webb, 1017 Prouty Avenue; *Treasurer,* M. W. Chapin.

TORONTO CAMERA CLUB—Toronto, Canada. In affiliation with the Royal Photographic Society of Great Britain. Established 1887. Incorporated 1893. Headquarters, 2 Gould Street. Membership, 201. Date of meetings, every Monday, from October to April, inclusive. *President,* A. Kelly; *Secretary-Treasurer,* Geo. Washington, 2 Gould Street, Toronto. Date of annual exhibition, March, April or May.

TRINIDAD CAMERA CLUB—Trinidad, Col. Established April 21, 1906. Meetings second Wednesday of every month at O. E. Aultman's Studio. Monthly competitions. *President,* W. L. Crouch; *Vice-President,* J. C. Bell; *Secretary and Treasurer,* W. Dearden, 717 Colorado Avenue. Member of American Lantern Slide Interchange.

WASHINGTON Y. M. C. A. CAMERA CLUB—Washington, D. C. Headquarters, Y. M. C. A. Building. Membership, 53. *President,* J. H. Schofield; *Vice-President,* W. L. Vetter; *Treasurer,* R. O. Fitch; *Secretary,* L. E. Truesdell.

WESLEY CAMERA CLUB—Headquarters, Kurz Opera House Building. Organized April 6, 1912. Meeting the first Monday of each month. *President,* W. A. Drewelow; *Vice-President,* Halvor Flom; *Secretary,* Lawrence Burke (Wesley, Iowa); *Treasurer,* F. A. Diekman.

WILKES-BARRE CAMERA CLUB—Wilkes-Barre, Pa. Rooms, Poli Building. Meets every Tuesday, 8 o'clock. *President,* W. H. Evans; *Secretary,* J. H. Prideaux, 171 Academy Street. Exhibition annually, in the spring.

WINNIPEG CAMERA CLUB—Enderton Building, Portege Avenue, Winnipeg, Manitoba, Canada. Organized February 29, 1902. Membership, 30. Meetings monthly at call of Secretary. Exhibition, second week in May. *President,* W. Rowe Lewis; *Secretary,* J. M. Iredale.

YONKERS CAMERA CLUB—Headquarters, Hollywood Inn Building. *President,* W. R. Cronk; *Vice-President,* C. A. Valentine, Jr.; *Secretary,* William Beck, 3 Guion Street; *Librarian,* Charles B. Carling; *Trustee,* Dr. S. L. Jeffrey.

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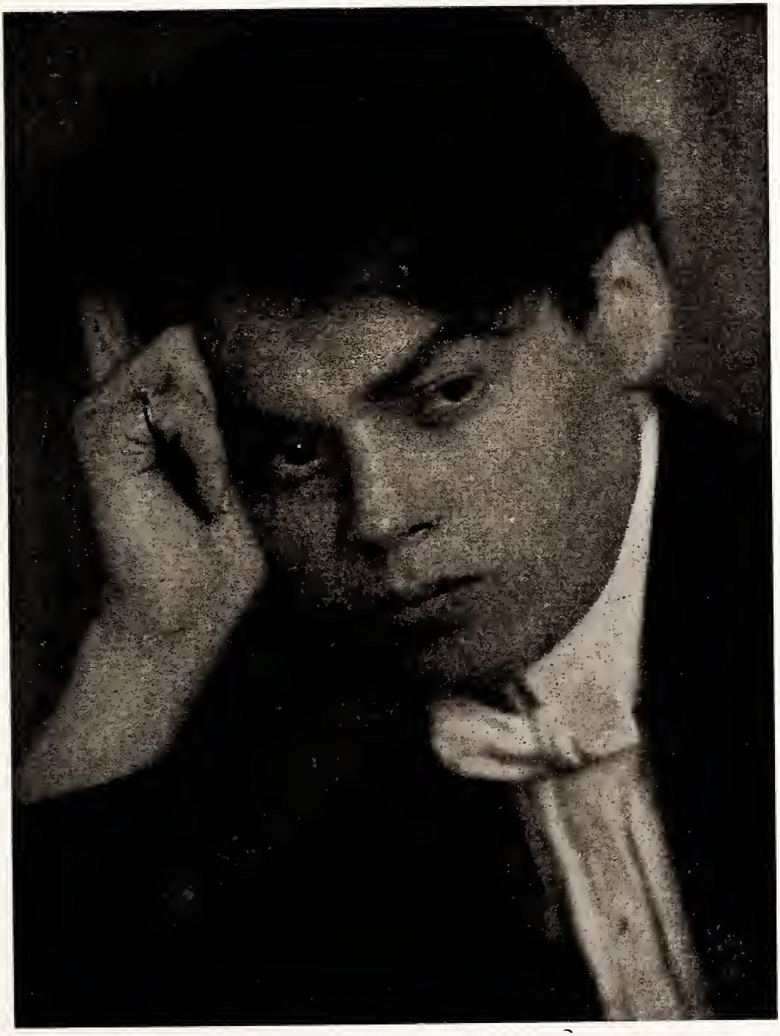
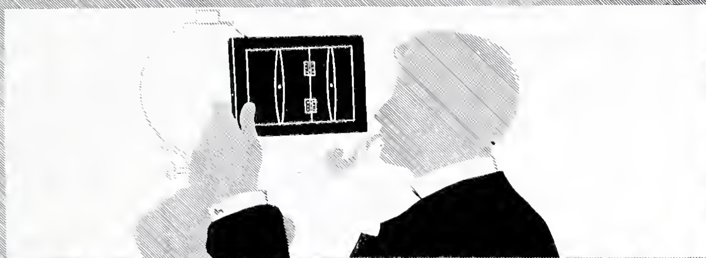


PORTRAIT. Rudolf Dührkoop.



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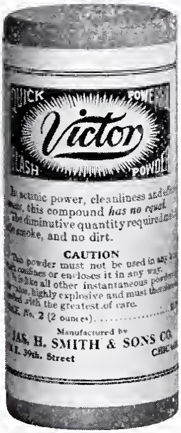

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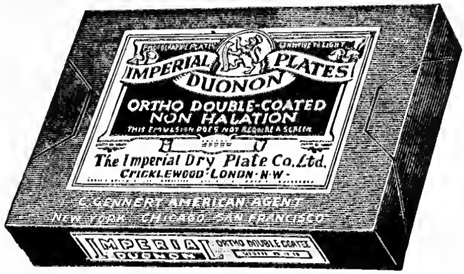

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