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(TIMES-BULLETIN)

FOR 1904

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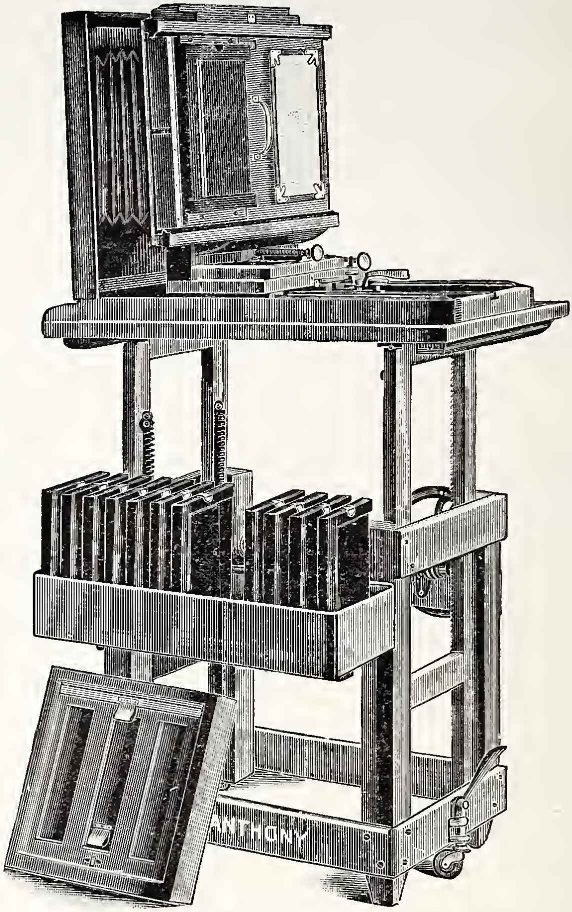

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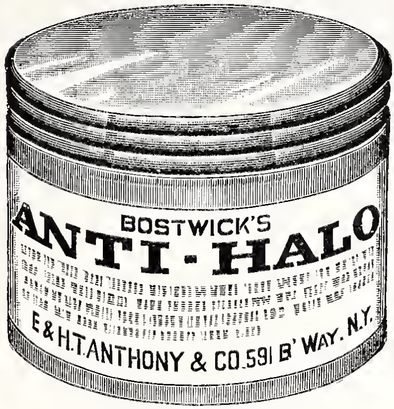

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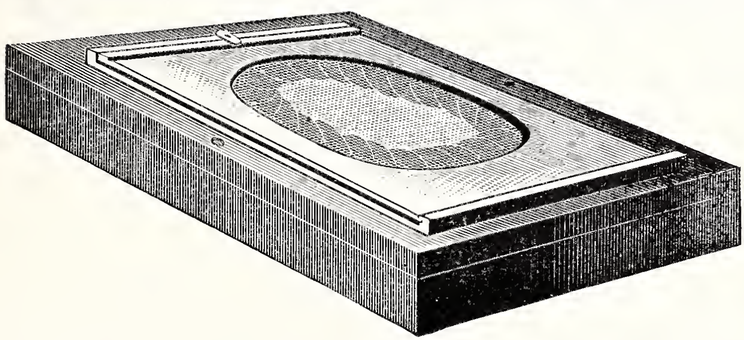

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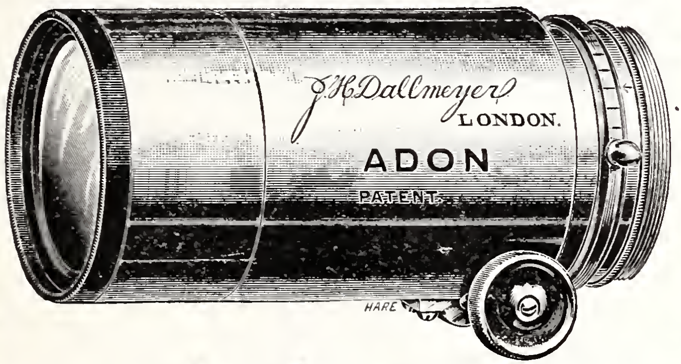

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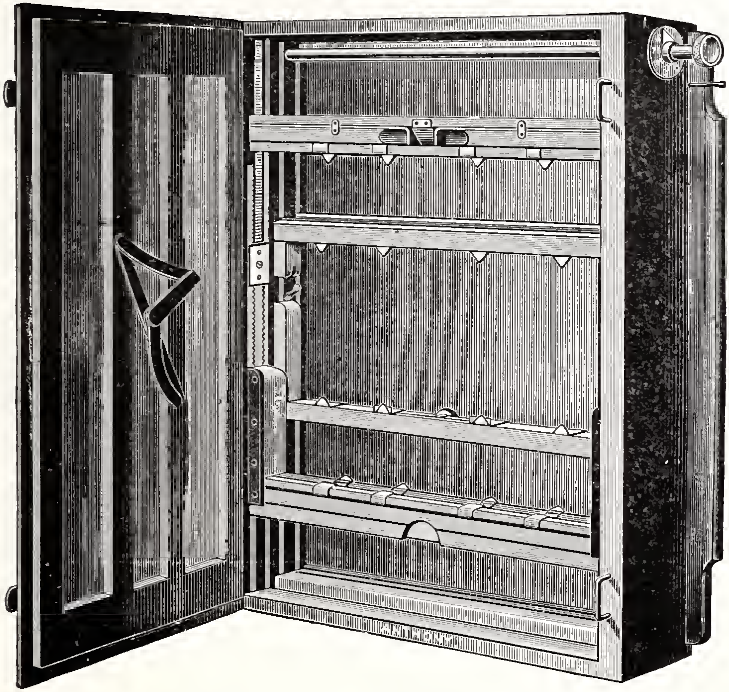

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FOR

1904

EDITED BY

SPENCER. B. HORD

EDITOR OF

THE PHOTOGRAPHIC TIMES-BULLETIN

THE ANTHONY AND SCOVILL COMPANY

NEW YORK

Press of Styles & Cash, New York

PREFACE.

IT has never been our custom to write a lengthy preface for the Annual, as the contents speak for themselves. We hope this volume will meet with your approval, as we have labored long and earnestly to make it just a little better than its predecessors.

To our many friends who have contributed so generously to its pages we extend our most sincere thanks.

Owing to the limitation as to the size of the volume and also to the limitations of the processes of reproduction we were unable to present all of the good things contributed, and to those failing to find their contribution we offer this explanation.

THE EDITOR.

November, 1903.

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January, 1904.

1st Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
1	**1**	F	7 25	4 43
2	**2**	Sa	7 25	4 44
3	**3**	S	7 25	4 45
4	**4**	M	7 25	4 46
5	**5**	Tu	7 25	4 47
6	**6**	W	7 25	4 48
7	**7**	Th	7 25	4 49
8	**8**	F	7 24	4 50
9	**9**	Sa	7 24	4 51
10	**10**	S	7 24	4 52
11	**11**	M	7 24	4 53
12	**12**	Tu	7 23	4 54
13	**13**	W	7 23	4 55
14	**14**	Th	7 23	4 56
15	**15**	F	7 22	4 57
16	**16**	Sa	7 22	4 59
17	**17**	S	7 21	5 00
18	**18**	M	7 21	5 01
19	**19**	Tu	7 21	5 02
20	**20**	W	7 20	5 03
21	**21**	Th	7 19	5 04
22	**22**	F	7 18	5 05
23	**23**	Sa	7 17	5 07
24	**24**	S	7 17	5 08
25	**25**	M	7 16	5 09
26	**26**	Tu	7 16	5 10
27	**27**	W	7 15	5 11
28	**28**	Th	7 14	5 13
29	**29**	F	7 13	5 14
30	**30**	Sa	7 12	5 15
31	**31**	S	7 12	5 16

February, 1904.

2d Month. 29 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
32	**1**	M	7 11	5 18
33	**2**	Tu	7 10	5 19
34	**3**	W	7 09	5 20
35	**4**	Th	7 07	5 21
36	**5**	F	7 06	5 22
37	**6**	Sa	7 05	5 23
38	**7**	S	7 04	5 25
39	**8**	M	7 03	5 26
40	**9**	Tu	7 02	5 27
41	**10**	W	7 01	5 28
42	**11**	Th	7 00	5 30
43	**12**	F	6 58	5 31
44	**13**	Sa	6 57	5 32
45	**14**	S	6 56	5 34
46	**15**	M	6 55	5 35
47	**16**	Tu	6 53	5 36
48	**17**	W	6 52	5 37
49	**18**	Th	6 51	5 39
50	**19**	F	6 49	5 40
51	**20**	Sa	6 48	5 41
52	**21**	S	6 46	5 43
53	**22**	M	6 45	5 44
54	**23**	Tu	6 44	5 45
55	**24**	W	6 42	5 46
56	**25**	Th	6 41	5 48
57	**26**	F	6 39	5 49
58	**27**	Sa	6 38	5 50
59	**28**	S	6 37	5 51
60	**29**	M	6 36	5 52

March, 1904.

3d Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M	N. Y. City. Sun sets. H. M.
61	**1**	Tu	6 35	5 53
62	**2**	W	6 34	5 53
63	**3**	Th	6 32	5 54
64	**4**	F	6 30	5 55
65	**5**	Sa	6 29	5 56
66	**6**	S	6 27	5 57
67	**7**	M	6 25	5 58
68	**8**	Tu	6 24	5 59
69	**9**	W	6 22	6 00
70	**10**	Th	6 20	6 01
71	**11**	F	6 19	6 02
72	**12**	Sa	6 17	6 03
73	**13**	S	6 16	6 04
74	**14**	M	6 14	6 05
75	**15**	Tu	6 12	6 06
76	**16**	W	6 11	6 08
77	**17**	Th	6 09	6 09
78	**18**	F	6 07	6 10
79	**19**	Sa	6 06	6 11
80	**20**	S	6 04	6 12
81	**21**	M	6 02	6 13
82	**22**	Tu	6 01	6 14
83	**23**	W	5 59	6 15
84	**24**	Th	5 58	6 16
85	**25**	F	5 56	6 17
86	**26**	Sa	5 54	6 18
87	**27**	S	5 52	6 19
88	**28**	M	5 51	6 20
89	**29**	Tu	5 49	6 21
90	**30**	W	5 47	6 22
91	**31**	Th	5 45	6 23

April, 1904.

4th Month. 30 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M	N. Y. City. Sun sets. H. M.
92	**1**	F	5 44	6 24
93	**2**	Sa	5 42	6 26
94	**3**	S	5 41	6 27
95	**4**	M	5 39	6 28
96	**5**	Tu	5 37	6 29
97	**6**	W	5 36	6 30
98	**7**	Th	5 34	6 31
99	**8**	F	5 33	6 32
100	**9**	Sa	5 31	6 33
101	**10**	S	5 30	6 34
102	**11**	M	5 28	6 35
103	**12**	Tu	5 26	6 36
104	**13**	W	5 25	6 37
105	**14**	Th	5 24	6 38
106	**15**	F	5 22	6 39
107	**16**	Sa	5 20	6 40
108	**17**	S	5 19	6 41
109	**18**	M	5 17	6 42
110	**19**	Tu	5 16	6 43
111	**20**	W	5 14	6 44
112	**21**	Th	5 13	6 45
113	**22**	F	5 11	6 46
114	**23**	Sa	5 10	6 47
115	**24**	S	5 08	6 48
116	**25**	M	5 07	6 49
117	**26**	Tu	5 06	6 50
118	**27**	W	5 04	6 51
119	**28**	Th	5 03	6 52
120	**29**	F	5 02	6 53
121	**30**	Sa	5 00	6 55

May, 1904.

5th Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
122	**1**	S	4 59	6 56
123	**2**	M	4 58	6 57
124	**3**	Tu	4 56	6 58
125	**4**	W	4 55	6 59
126	**5**	Th	4 54	7 00
127	**6**	F	4 53	7 01
128	**7**	Sa	4 52	7 02
129	**8**	S	4 51	7 03
130	**9**	M	4 49	7 04
131	**10**	Tu	4 48	7 05
132	**11**	W	4 47	7 06
133	**12**	Th	4 46	7 07
134	**13**	F	4 45	7 08
135	**14**	Sa	4 44	7 09
136	**15**	S	4 43	7 10
137	**16**	M	4 42	7 11
138	**17**	Tu	4 41	7 12
139	**18**	W	4 40	7 13
140	**19**	Th	4 39	7 14
141	**20**	F	4 39	7 15
142	**21**	Sa	4 38	7 16
143	**22**	S	4 37	7 17
144	**23**	M	4 36	7 18
145	**24**	Tu	4 36	7 19
146	**25**	W	4 35	7 20
147	**26**	Th	4 34	7 20
148	**27**	F	4 34	7 21
149	**28**	Sa	4 33	7 22
150	**29**	S	4 32	7 23
151	**30**	M	4 32	7 23
152	**31**	Tu	4 31	7 24

June, 1904.

6th Month. 30 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
153	**1**	W	4 31	7 24
154	**2**	Th	4 30	7 25
155	**3**	F	4 30	7 26
156	**4**	Sa	4 30	7 26
157	**5**	S	4 29	7 27
158	**6**	M	4 29	7 28
159	**7**	Tu	4 29	7 28
160	**8**	W	4 29	7 29
161	**9**	Th	4 28	7 30
162	**10**	F	4 28	7 30
163	**11**	Sa	4 28	7 31
164	**12**	S	4 28	7 31
165	**13**	M	4 28	7 32
166	**14**	Tu	4 28	7 32
167	**15**	W	4 28	7 32
168	**16**	Th	4 28	7 33
169	**17**	F	4 28	7 33
170	**18**	Sa	4 28	7 33
171	**19**	S	4 28	7 34
172	**20**	M	4 29	7 34
173	**21**	Tu	4 29	7 34
174	**22**	W	4 29	7 34
175	**23**	Th	4 29	7 34
176	**24**	F	4 29	7 34
177	**25**	Sa	4 30	7 35
178	**26**	S	4 30	7 35
179	**27**	M	4 30	7 35
180	**28**	Tu	4 31	7 35
181	**29**	W	4 31	7 35
182	**30**	Th	4 32	7 35

July, 1904.

7th Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
183	**1**	F	4 32	7 35
184	**2**	Sa	4 32	7 35
185	**3**	S	4 33	7 34
186	**4**	M	4 33	7 34
187	**5**	Tu	4 34	7 34
188	**6**	W	4 35	7 34
189	**7**	Th	4 35	7 33
190	**8**	F	4 36	7 33
191	**9**	Sa	4 37	7 33
192	**10**	S	4 37	7 32
193	**11**	M	4 38	7 32
194	**12**	Tu	4 39	7 31
195	**13**	W	4 39	7 31
196	**14**	Th	4 40	7 30
197	**15**	F	4 41	7 30
198	**16**	Sa	4 42	7 29
199	**17**	S	4 43	7 29
200	**18**	M	4 44	7 28
201	**19**	Tu	4 44	7 27
202	**20**	W	4 45	7 26
203	**21**	Th	4 46	7 26
204	**22**	F	4 47	7 25
205	**23**	Sa	4 48	7 24
206	**24**	S	4 48	7 23
207	**25**	M	4 49	7 23
208	**26**	Tu	4 50	7 22
209	**27**	W	4 51	7 21
210	**28**	Th	4 52	7 20
211	**29**	F	4 53	7 19
212	**30**	Sa	4 54	7 18
213	**31**	S	4 55	7 17

August, 1904.

8th Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
214	**1**	M	4 56	7 16
215	**2**	Tu	4 57	7 14
216	**3**	W	4 58	7 13
217	**4**	Th	4 59	7 12
218	**5**	F	5 00	7 11
219	**6**	Sa	5 01	7 10
220	**7**	S	5 02	7 09
221	**8**	M	5 03	7 07
222	**9**	Tu	5 04	7 06
223	**10**	W	5 05	7 05
224	**11**	Th	5 06	7 04
225	**12**	F	5 07	7 02
226	**13**	Sa	5 08	7 01
227	**14**	S	5 09	7 00
228	**15**	M	5 10	6 58
229	**16**	Tu	5 11	6 57
230	**17**	W	5 12	6 5[illegible]
231	**18**	Th	5 13	6 54
232	**19**	F	5 14	6 53
233	**20**	Sa	5 15	6 51
234	**21**	S	5 16	6 50
235	**22**	M	5 17	6 48
236	**23**	Tu	5 17	6 47
237	**24**	W	5 18	6 45
238	**25**	Th	5 19	6 44
239	**26**	F	5 20	6 42
240	**27**	Sa	5 21	6 41
241	**28**	S	5 22	6 39
242	**29**	M	5 23	6 37
243	**30**	Tu	5 24	6 36
244	**31**	W	5 25	6 34

September, 1904.

9th Month. 30 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
245	**1**	Th	5 26	6 33
246	**2**	F	5 27	6 31
247	**3**	Sa	5 28	6 29
248	**4**	S	5 29	6 28
249	**5**	M	5 30	6 26
250	**6**	Tu	5 31	6 25
251	**7**	W	5 32	6 23
252	**8**	Th	5 33	6 21
253	**9**	F	5 34	6 20
254	**10**	Sa	5 35	6 18
255	**11**	S	5 36	6 16
256	**12**	M	5 37	6 15
257	**13**	Tu	5 38	6 13
258	**14**	W	5 39	6 11
259	**15**	Th	5 40	6 09
260	**16**	F	5 41	6 08
261	**17**	Sa	5 42	6 06
262	**18**	S	5 43	6 04
263	**19**	M	5 44	6 03
264	**20**	Tu	5 45	6 01
265	**21**	W	5 46	5 59
266	**22**	Th	5 47	5 58
267	**23**	F	5 48	5 56
268	**24**	Sa	5 49	5 55
269	**25**	S	5 50	5 53
270	**26**	M	5 51	5 52
271	**27**	Tu	5 52	5 50
272	**28**	W	5 53	5 48
273	**29**	Th	5 54	5 46
274	**30**	F	5 54	5 44

October, 1904.

10th Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
275	**1**	Sa	5 56	5 43
276	**2**	S	5 57	5 41
277	**3**	M	5 58	5 39
278	**4**	Tu	5 59	5 38
279	**5**	W	6 00	5 36
280	**6**	Th	6 01	5 35
281	**7**	F	6 02	5 33
282	**8**	Sa	6 03	5 31
283	**9**	S	6 04	5 30
284	**10**	M	6 05	5 28
285	**11**	Tu	6 07	5 27
286	**12**	W	6 08	5 25
287	**13**	Th	6 09	5 23
288	**14**	F	6 10	5 22
289	**15**	Sa	6 11	5 20
280	**16**	S	6 12	5 19
281	**17**	M	6 13	5 17
282	**18**	Tu	6 14	5 16
283	**19**	W	6 15	5 14
284	**20**	Th	6 16	5 13
285	**21**	F	6 18	5 12
286	**22**	Sa	6 19	5 10
287	**23**	S	6 20	5 09
288	**24**	M	6 21	5 07
289	**25**	Tu	6 22	5 06
300	**26**	W	6 23	5 04
301	**27**	Th	6 24	5 03
302	**28**	F	6 26	5 02
303	**29**	Sa	6 27	5 01
304	**30**	S	6 28	4 59
305	**31**	M	6 29	4 58

November, 1904.

11th Month. 30 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M	N. Y. City. Sun sets. H. M.
306	**1**	Tu	6 30	4 57
307	**2**	W	6 31	4 56
308	**3**	Th	6 32	4 54
309	**4**	F	6 34	4 53
310	**5**	Sa	6 35	4 52
311	**6**	S	6 36	4 51
312	**7**	M	6 37	4 50
313	**8**	Tu	6 38	4 49
314	**9**	W	6 40	4 48
315	**10**	Th	6 41	4 47
316	**11**	F	6 42	4 46
317	**12**	Sa	6 43	4 45
318	**13**	S	6 44	4 44
319	**14**	M	6 46	4 43
320	**15**	Tu	6 47	4 42
321	**16**	W	6 48	4 41
322	**17**	Th	6 49	4 40
323	**18**	F	6 50	4 39
324	**19**	Sa	6 51	4 39
325	**20**	S	6 53	4 38
326	**21**	M	6 54	4 38
327	**22**	Tu	6 55	4 37
328	**23**	W	6 56	4 36
329	**24**	Th	6 57	4 36
330	**25**	F	6 58	4 35
331	**26**	Sa	6 59	4 35
332	**27**	S	7 00	4 35
333	**28**	M	7 02	4 34
334	**29**	Tu	7 03	4 34
335	**30**	W	7 04	4 34

December, 1904.

12th Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	N. Y. City Sun rises. H. M	N. Y. City Sun sets. H. M
336	**1**	Th	7 05	4 34
337	**2**	F	7 06	4 33
338	**3**	Sa	7 07	4 33
339	**4**	S	7 08	4 33
340	**5**	M	7 09	4 32
341	**6**	Tu	7 10	4 32
342	**7**	W	7 11	4 32
343	**8**	Th	7 12	4 32
344	**9**	F	7 13	4 32
345	**10**	Sa	7 14	4 32
346	**11**	S	7 15	4 32
347	**12**	M	7 15	4 32
348	**13**	Tu	7 16	4 33
349	**14**	W	7 16	4 33
350	**15**	Th	7 17	4 33
351	**16**	F	7 18	4 33
352	**17**	Sa	7 18	4 33
353	**18**	S	7 19	4 34
354	**19**	M	7 20	4 34
355	**20**	Tu	7 20	4 35
356	**21**	W	7 21	4 35
357	**22**	Th	7 21	4 36
358	**23**	F	7 22	4 37
359	**24**	Sa	7 22	4 37
360	**25**	S	7 23	4 38
361	**26**	M	7 23	4 39
362	**27**	Tu	7 23	4 39
363	**28**	W	7 23	4 40
364	**29**	Th	7 24	4 40
365	**30**	F	7 24	4 41
366	**31**	Sa	7 24	4 42

Reference Calendar for Three Years.

1903

Month	S	M	T	W	T	F	S
Jan.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
Feb.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
Mar.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
April	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
May	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..
June	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	..	..	..	..
July	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
Aug.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
Sept.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	..	..	..
Oct.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
Nov.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	..	..	..	..	..
Dec.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..

1904

Month	S	M	T	W	T	F	S
Jan.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..
Feb.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	..	..	..	..	..
Mar.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
April	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
May	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
June	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
July	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..
Aug.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Sept.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
Oct.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
Nov.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	..	..	..
Dec.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31

1905

Month	S	M	T	W	T	F	S
Jan.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Feb.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	..	..	..	..
Mar.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
April	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..
May	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
June	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
July	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
Aug.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
Sept.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
Oct.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Nov.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
Dec.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..

Eclipses in 1904.

NOTE.—*Local mean time for the latitude of New York City is used in reckoning eclipses, sunset and sunrise. Subtract four minutes to change the reckoning to Eastern standard time of 75th meridian.*

Moon's phases are calculated for Eastern standard time. "Morn," is understood to extend from Midnight to Noon; "Eve," from Noon to Midnight.

In the year 1904 there will be but two Eclipses, the least number possible, and both of the Sun, as must always be the case in such an event.

I. An Annular Eclipse of the Sun, March 17, invisible in the United States except in the Pacific possessions.

II. A Total Eclipse of the Sun, September 9, invisible in the United States except in Hawaii.

The Seasons.

SPRING begins...........March 20, 3 p.m.	AUTUMN begins..... September 23, 2 a.m.
SUMMER begins.............June 21, noon.	WINTER begins.......December 21, 9 p.m.

Church Days.

Septuagesima Sun..Jan. 31	Good Friday........Apr. 1
Sexagesima Sun....Feb. 7	Easter Sunday......Apr. 3
Quinquagesima Sun Feb. 14	Low Sunday........Apr. 10
Shrove Tuesday.....Feb. 16	Rogation Sunday...May 8
Ash Wednesday.....Feb. 17	Ascension Day......May 12
Quadragesima Sun..Feb. 21	Whitsunday (Pent.).May 22
Mid-Lent Sun.......Mar. 13	Trinity Sunday. ...May 29
Passion Sun........Mar. 20	Corpus Christi......June 2
Palm Sunday ....Mar. 27	Advent Sunday.... Nov. 27

Chronological Cycles.

Dominical Letter	CB
Epact....................	13
Lunar Cycle (Gold. No.)	5
Solar Cycle........... ...	9
Roman Indiction........	2
Julian Period...........	6617
Dionysian Period.......	233
Jewish Lunar Cycle.....	2

Chronological Eras.

The year 1904, which comprises the latter part of the 128th and the first part of the 129th year of the INDEPENDENCE OF THE UNITED STATES OF AMERICA, corresponds to the year 6617 of the JULIAN PERIOD; the year 7412-7413 of the BYZANTINE ERA; the year 5664–65 of the JEWISH ERA; the year 2657 since the FOUNDATION OF ROME, according to Varro; the year 2680 of the OLYMPIADS; the year 1620 of the era of DIOCLETIAN; the year 2564 of the JAPANESE ERA; the year 1321–22 of the MOHAMMEDAN ERA.

The 1st day of January of the year 1904 is the 2,416,481st day since the commencement of the JULIAN PERIOD.

The JULIAN CALENDAR, which is still used in the Russian Empire, dates twelve days back of our own—the GREGORIAN CALENDAR. Thus a letter from St. Petersburg dated January 1st was really written on January 13th.

The Russians generally use, in official documents and frequently in business correspondence, two dates, which they call "old style" and "new style"; and in Alaska three dates have been used on their documents, because the early navigators forgot to make allowance for the crossing of the 180th meridian in sailing from Siberia to North America.

Legal Holidays in the Various States.

JAN. 1. NEW YEAR'S DAY: In all States except Massachusetts, New Hampshire and Rhode Island.

JAN. 8. ANNIVERSARY OF THE BATTLE OF NEW ORLEANS: In Louisiana.

JAN. 19. LEE'S BIRTHDAY: In Georgia, North Carolina and Virginia.

FEB. 12. LINCOLN'S BIRTHDAY: In all States.

FEB. 22. WASHINGTON'S BIRTHDAY: In all States except Arkansas, Iowa and Mississippi

FEB. 19 MARDI-GRAS: In Alabama and Louisiana

MARCH 2. ANNIVERSARY OF TEXAN INDEPENDENCE: In Texas.

MARCH 4. FIREMEN'S ANNIVERSARY: In New Orleans, La.

APRIL 1. GOOD FRIDAY: In Alabama, Louisiana, Maryland, Pennsylvania and Tennessee.

APRIL 19. PATRIOTS' DAY: In Massachusetts.

APRIL 21. ANNIVERSARY OF THE BATTLE OF SAN JACINTO: In Texas.

APRIL 26. MEMORIAL DAY: In Alabama and Georgia.

MAY 4. CHARTER DAY: In New York City.

MAY 10. MEMORIAL DAY: In North Carolina.

MAY 20. ANNIVERSARY OF THE SIGNING OF THE MECKLENBURG DECLARATION OF INDEPENDENCE: In North Carolina.

MAY 30. DECORATION DAY: In Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Iowa, Illinois, Indiana, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, Vermont, Wisconsin, Washington and Wyoming.

JUNE 3. JEFFERSON DAVIS'S BIRTHDAY: In Florida.

JUNE 17. BATTLE OF BUNKER HILL: In Boston, Mass.

JULY 4. INDEPENDENCE DAY: In all States.

JULY 24. PIONEERS' DAY: In Utah.

SEPT. 7. LABOR DAY: In Alabama, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Montana, Nebraska, New Hampshire, New Jersey, New York,

Legal Holidays (Continued).

Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia and Washington.

SEPT. 9. ADMISSION DAY: In California.

SEPT. 12. LABOR DAY: In Florida.

OCT. 31. ADMISSION DAY: In Nevada.

NOV. 8. GENERAL ELECTION DAY: In Arizona, California, Idaho, Indiana, Kansas, Maryland, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, West Virginia, Washington, Wisconsin and Wyoming.

NOV. 25 LABOR DAY: In Louisiana.

NOV. 24. THANKSGIVING DAY: In all States, though in some it is not a statutory holiday.

DEC. 25. CHRISTMAS DAY. In all States; in South Carolina, the two succeeding days in addition.

SUNDAYS AND FAST DAYS are legal holidays in all States, which designate them as such.

ARBOR DAY is a legal holiday in Kansas, North Dakota, Rhode Island and Wyoming, the day being set by the Governor—in Nebraska, April 22; California, September 9; Colorado, third Friday in April; Montana, third Tuesday in April; Utah, first Saturday in April; Idaho, Friday after May 1.

EVERY SATURDAY after 12 o'clock noon is a legal holiday in New York, New Jersey, New Orleans, Pennsylvania and Maryland; and from June 1 to September 30 in New Castle Co., Del.

THERE are no national holidays, not even the Fourth of July. Congress has at various times appointed special holidays. In the second session of the Fifty-third Congress, it passed an act making Labor Day a public holiday in the District of Columbia; and it has recognized the existence of certain days as holidays, for commercial purposes, in such legislation as the Bankruptcy act, but with the exception named, there is no general statute on the subject. The proclamation of the President designating a day of thanksgiving only, makes it a holiday in those States which provide by law for it.

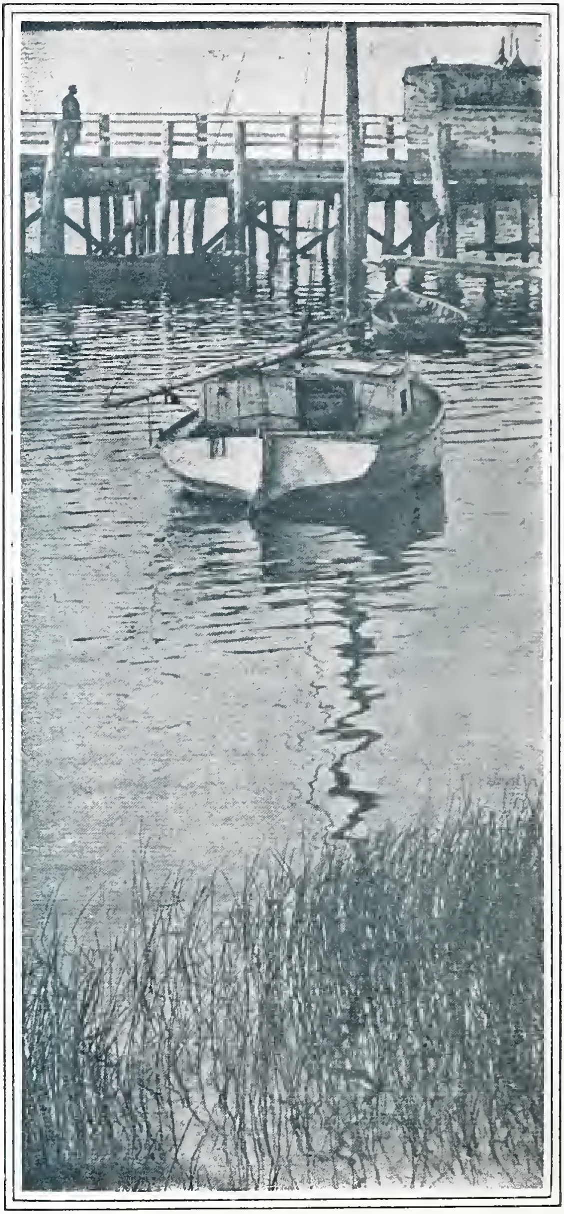
United States and Territories.

States and Territories.	Populat'n in 1900.	Capitals.	States and Territories.	Populat'n in 1900.	Capitals.
Alabama	1,828,697	Montgomery.	Montana	243,329	Helena.
Alaska Terr	63,441	Sitka.	Nebraska	1,068,539	Lincoln.
Arizona Terr	122,931	Phœnix.	Nevada	42,335	Carson City.
Arkansas	1,311,564	Little Rock	New Hampshire.	411,588	Concord.
California	1,485,053	Sacramento.	New Jersey	1,883,669	Trenton.
Colorado	539,700	Denver.	New Mexico T.	195,310	Santa Fé.
Connecticut	908,355	Hartford.	New York	7,268,012	Albany.
Delaware	184,735	Dover.	North Carolina.	1,893,810	Raleigh.
Florida	528,542	Tallahassee.	North Dakota	319,146	Bismark.
Georgia	2,216,331	Atlanta.	Ohio	4,157,545	Columbus.
Idaho	161,772	Boise City.	Oklahoma Terr.	398,245	Guthrie.
Illinois	4,821,550	Springfield.	Oregon	413,536	Salem
Indiana	2,516,462	Indianapolis.	Pennsylvania	6,302,115	Harrisburg.
Indian Terr	391,960		Rhode Island	428,556	Providence.
Iowa	2,231,853	Des Moines	South Carolina.	1,340,316	Columbia.
Kansas	1,470,495	Topeka.	South Dakota	401,570	Pierre.
Kentucky	2,147,174	Frankfort.	Tennessee	2,020,616	Nashville.
Louisiana	1,381,625	Baton Rouge.	Texas	3,048,710	Austin.
Maine	694,466	Augusta.	Utah Terr	276,749	Salt Lake City.
Maryland	1,190,050	Annapolis.	Vermont	343,641	Montpelier.
Massachusetts	2,805,346	Boston.	Virginia	1,854,184	Richmond.
Michigan	2,420,982	Lansing.	Washington	518,103	Olympia.
Minnesota	1,751,394	St. Paul.	West Virginia	958,800	Charleston.
Mississippi	1,551,270	Jackson.	Wisconsin	2,069,042	Madison.
Missouri	3,106,665	Jefferson City.	Wyoming	92,531	Cheyenne.

Difference in Time (for Cable Purposes).

BETWEEN THE CITY OF NEW YORK AND THE PRINCIPAL FOREIGN CITIES.

LATER THAN NEW YORK.	H. M.		H. M.		H. M.	EARLIER THAN NEW YORK.	H. M.
Antwerp	5 13.5	Dublin	4 30.5	Rio de Janeiro.	2 3.2	Havana	0 33.5
Berlin	5 49.5	Edinburgh	4 43.2	Rome	5 45.8	Hong Kong	11 27.4
Bremen	5 31.0	Geneva	5 20.5	St. Petersburg	6 57.1	Melbourne	9 24.2
Brussels	5 13.4	Hamburg	5 35.8	Valparaiso	0 9.3	Mexico City of	1 40.5
Buenos Ayres	1 2.4	Liverpool	4 43.6	Vienna	6 1.2	Panama	0 22.2
Calcutta	11 49.2	London	4 55.9	Halifax	0 41.5	Yokohama	9 45.5
Constantinople	6 51.9	Madrid	4 41.1				
		Paris	5 5.2				



THE LANDING. John Dolman.

THE AMERICAN ANNUAL OF PHOTOGRAPHY (Times-Bulletin) for 1904

Edited by SPENCER B. HORD.

MAY MORNING J. H. Field.

AMERICA'S PLACE IN ART.

By A. H. GRIFFITH.

LA PHOTOGRAPHIE DU NU. Louis Fleckenstein.

OR America, about one hundred and twenty-five years old, to claim a place in art seems absurd, and yet why should she not do so is a question hard to answer. The world to-day moves rapidly. Art belongs to no country and to no age. It is the spontaneous outburst of a people wishing to give expression to a thought. The ancient Egyptians sought to idealize the gods of nature. The sun, moon and stars were to them deities controlling the works of man and to them they wished to give the honor and glory which seemed to be their due. The River Nile from whom they received their richest blessings was ever in their thoughts. It came from whence they knew not, nor did they care so long as it made their land fruitful. Their kings were begotten by the gods and these same kings sought to perpetuate the belief of the people. Everywhere temples rose, covered with sculptures linking their names and deeds with all that was sublime and great.

The Greeks followed, only instead of the planets their gods and goddesses took on the semblance of a perfect man or woman. Jupiter hurled his mighty thunder bolts from Mount Olympus. Venus rose from the foam of the sea and there sprang into existence that glorious throng that peopled their mythology. Thus their temples became things of beauty, idealizing the human figure divine, full of all the passion that actuated the denizens of earth. Rome caught the spirit, but gave the glory to men who through their genius of letters, oratory or triumphs in warfare became the idols of the people. To them were erected columns, arches and monuments celebrating their deeds of statesmanship or war. But it required hundreds of years to bring the people to this high state of civilization and then came the reaction, the decadence and for over a thousand years art, science and all human endeavor ceased, the night of the dark ages covered the world. The world was resting from its mighty efforts of the past. Then almost at a single moment from every land there sprang into existence that galaxy of men in art, science and letters whom we call the old masters. Inspired by a religious fervor Christianity furnished the theme for painter, sculptor and scholar. Architecture with one mighty stride filled the old countries with those wonderful churches, cathedrals and shrines which are at once the wonder, admiration and despair of the modern builder—all this at a time when America slumbered in the sleep of the unknown—but it was the sleep of a giant whose awakening steps meant the march of a new nation, a new empire whose greatness was to thrill the world with energy.

Very early we began our strivings after art; crude it is true as every nation had striven before us, but we were quick to see our weakness. Our men struggled with mighty odds—poverty, the lack of appreciation, all did much to retard our advance. Our men went abroad to catch something of the spirit of the old world. They saw with new and fresh eyes the things they could not grasp, but the longing, the ambition was there and after three generations they gained a firmer foothold. This was followed by other advances until to-day the artists of America stand side and side with the best. Abbey, Sargeant, Chase, Melchers and others are recognized and winning golden opinions from every capital in Europe. Nor is this all. In the old days force of arms and conquest was often made the pretext for robbery, and the spoils of war were largely the works of art that adorned palaces and churches. Now the mighty fortunes of American millionaires are collecting the great things of earth for a resting place in American galleries and museums. Is it the beginning of a time when the artists of foreign lands will have to journey westward to study that which is best? Already the cry is going up that the art student need not leave this country to secure an education. Art thrives best in an atmosphere of art. Surrounded by the beautiful things our thoughts and ideals are elevated and we are led to a higher appreciation of the beauties of nature. This fact is proven by every day experience. I have in my mind two boys who three years ago came from different farms, knew nothing of pictures nor art of any kind, never dreamed of that wondrous nature with which they had been associated all their lives. Gradually their perceptions were awakened and to-day they are filled with that love of the beautiful which makes their lives better and more enjoyable. They go again to the old farm, but it is with sketch book and camera—they have found new scenes where before all was dull and obscure and they are but a type of many who simply need be shown the way.

But some one says, "What has this to do with photography." Let me answer. Never before were there so many cameras in use—thousands of them in the hands of men and women—not all amateurs who have not the slightest idea of composition or that which makes a picture, and yet those people cannot fail to get some good out of them, and by and by the thought will dawn upon them that their pictures lack something that the camera, no matter how good, cannot give. Then they will realize that there it something in art besides the tools, and this is not confined to landscape alone but is often found in the studio of the man who makes it a business. He may wonder why Brown has such success and he fails. The chances are that Brown is not satisfied with knowing what his camera and chemicals will do, but is using every opportunity to enrich his mind with the ideals of the best craftsmen. Brown has learned that pictures do not consist of light and shadow, an image, but that there must be something of the personality of the sitter in it. He must catch not only the form but the character, that something that makes the subject individual, a living reality. This is art and it comes by hard, unceasing study, leaving no stone unturned that will lead to success. Every other profession is secured after long years of patient training. Why should the photographer be a master of his craft after serving six months or a year? To be a success at anything means work, study, thought; but most of all a love for the work, that love which comes out of the finger tips of the man who says "my ideals are high and I shall not be satisfied until I attain them."

W. von Gloeden.

KIMONO GIRL. Knaffl & Bro.

ORIGINALITY IN PHOTOGRAPHY.

By HARRY C. RUBINCAM.

F. E. Marks.

THE dearth of originality in the field of photography is appalling to one seriously contemplating its artistic aspect. Many photographers strive for artistic results when their very lack of original conceptions forever bars them from reaching the goal of their ambitions. Others have the requisite amount of genius, but fail to exercise it because they become lost in the pursuit of some other man's effects. It is generally known that the only way to secure that exercise and fostering of an artistic temperament necessary to successful interpretation is to study the works of the masters, both old and new—painters, sculptors and those photographers who have been recognized the world over as masters of the camera as a medium of expression. Some seem to think this does not only mean one must impress upon one's mind the method of handling the subject, but the subjects themselves must be in some way dragged into all their efforts. Some, perhaps, unconsciously absorb the subject and unconsciously duplicate it; but others, and it seems to be the majority, say, "Here is the subject; it is artistic, let us go and make something like it." And they go forthwith, and when they find their hackneyed efforts do not bring the reward due to artistic originality, they rail against art and its exponents and champions. If you will take the back numbers of the photographic publications and compare them carefully, you will find that the majority of the illustrations in succeeding issues are strikingly suggestive of illustrations in preceding issues. There are poses and lightings and drapery effects in portraiture that show too plainly the studied effort to duplicate the first idea, and in landscape there is an almost stencil-like similarity that absolutely precludes any other conclusion but that they are copied results.

It would not be difficult to name a dozen successful prints that have resulted in hundreds of others as nearly like them as it was possible for the copyists to make them. It is evident in these cases that the copyist has worked hard, going sometimes even so far as to procure models with a similarity of features and in the case of landscape it no doubt required many and tiresome journeys to find an indentical spot. How many times have I heard camerists exclaim, upon looking at a picture, "Why I know a place just like that! I must go and photograph it." Now among certain people these copyists get some reputation (?), but among those having a knowledge of art, which involves, by the way, familiarity with contemporary art as well as the precepts, these sham efforts are immediately detected and awarded their due merit, often to the wonderment of the copyist who invariably feels that, having fulfilled all the demands of art, as conceived by him, nothing but the individual prejudice or enmity of the judges could have influenced their condemnation. To study the pictures of those photographers admittedly artistic, is good for the amateur's welfare so long as he keeps constantly in mind the necessity for originality; but when he studies them with the idea of duplicating them, he is descending the steps of failure. Remember, then, that above all other things you must be original. Some of the masters have violated all the known rules of art in some of their greatest works, but they were original. Be better satisfied with a dozen original prints, as a result of your year's work, than with five hundred prints suggested by some other fellow's work. Of all the themes of all the ages there are still new ones to be found as well as new ways of presenting the old ones, and the man who spreads his knowledge of art with unlimited originality is the one who merits and receives the plaudits of the artistic world.

PORTRAIT. The Misses Selby.

PERPETUAL EXPOSURE TABLE.

By ULYSSES G. ORR.

THE TURN OF THE ROAD.
W. and G. Parrish.

MANY an experienced amateur is doubtful, at times, as to the proper exposure for a view about to be photographed, and the tyro is all at sea most of the time. The following table will help both of them, and it will be admitted that with proper exposure a reasonably good negative is almost sure to result.

The table is based on the exposure chart published by me in the Annual of 1900, and is compiled for the first of each month, for a rapid plate, the Cramer Crown, at stop U. S. No. 8, for open views, in bright sunshine. An allowance must be made for views with unusually heavy foliage in the foreground or for variations of light, bright clouds requiring about double the exposure, and dark clouds double that for cloudy bright. In general, it may be stated that the medium speed plates require double the exposure of the extra rapid and the slow plates double that of the medium.

A rapid plate was selected for the table because the majority of amateurs use them, although the use of a slow plate, when the subject permits it, is much to be recommended. The advanced amateur will readily adapt the table to the plate he may be using.

The first and last columns of figures are the hours of the day; the figures opposite the hours represent fractions of a second, it being understood that the numerator is one in each case.

To use the table the time of day is noted, the intensity of light, whether bright sun, light or dark clouds, etc., and the diaphragm then set at such an opening that the working speed of shutter gives the required exposure called for by the table.

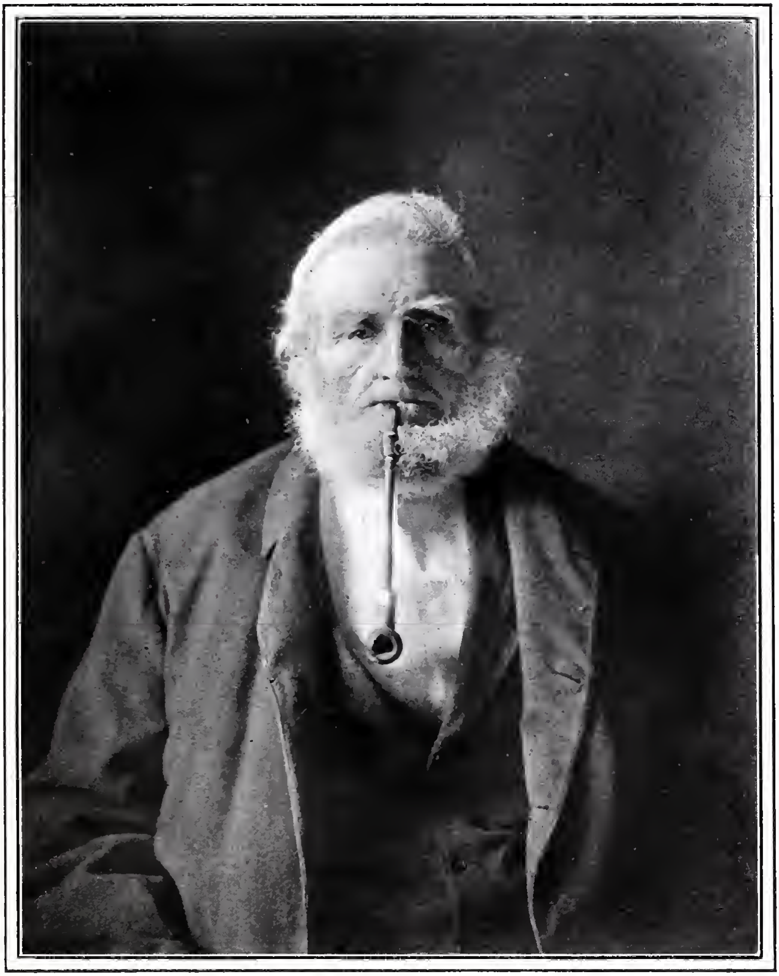
For example : An average landscape is to be taken at three o'clock in May, in bright sunlight. The table shows 1/200th second as the correct exposure, for a rapid plate. With a shutter working at 1/25th second, the average speed of shutters, the diaphragm would be set at U. S. No. 64, which would be equivalent to a shutter speed of 1/200th second at 8.

The speed at 8 is as indicated, 1/25th second ; at 16, the light is cut down one-half, so the speed is equal to 1/50th second; at 32, it is 1/100th second, and at 64, 1/200th second. Now suppose the same view, at the same time, on a day when dark clouds obscure the light, four times the exposure would be required, or 1/50th second.

A correct exposure on any plate will show the equivalent of table to be used at any time of the year for that plate.

TABLE.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
7	....	4	22	54	85	103	103	88	65	34	15	4	7
8	14	22	49	94	135	158	152	112	112	83	47	28	8
9	42	56	90	139	184	204	202	187	157	126	88	62	9
10	74	92	130	180	226	246	249	231	200	161	116	85	10
11	97	119	156	213	260	288	291	270	230	187	136	108	11
12	108	132	172	228	280	311	316	291	246	200	145	112	12
1	103	133	174	226	270	303	307	284	241	188	142	112	1
2	90	121	161	208	244	267	280	257	220	166	116	91	2
3	62	93	130	168	200	222	228	215	179	128	88	62	3
4	27	58	90	121	152	172	182	170	136	90	49	27	4
5	....	16	45	76	103	123	132	121	90	42	4	....	5
6	....	....	....	31	58	76	85	70	38	....	....	....	6
7	....	....	....	9	36	54	55	41	22	....	....	....	7



PORTRAIT STUDY. E. L. Mix.

WORKING IN HARMONY.

By FRANK V. CHAMBERS.

WASHDAY IN THE COUNTRY. Louis Fleckenstein.

EVERYBODY is familiar with the squabbles in large organizations, particularly photographic societies. Not that the members desire this seemingly necessary adjunct (the squabbles), but they occur nevertheless.

Being personally a member of seven different photographic organizations, there is but one (in a southern city) that seems to work in harmony. The members work for one another, a feeling of good-fellowship prevails, and general photographic knowledge freely imparted to one another.

Five friends a little over a year ago asked me to assist them in forming a new photographic club in the neighborhood of their homes. As I had been instrumental but a few months before in starting one, I advised them against it, stating the difficulties and also the squabbles even in this new organization. I requested that the five form a working club of their own, and, if possible, rent a small room at a moderate rate, where they could work together. This plan met with approval, and the five, after trying the method for six months, increased the number to ten, where the membership remains closed, and no more taken in until there is a resignation.

In the start, a joint account of stock was taken, each man contributing some paraphernalia toward fitting and furnishing, with a fee of ten dollars from each to defray the cost of plumbing, which footed up to thirty-six dollars for installing sinks in two dark rooms and for the washing tank. A room was rented in a side street over a shop, at two dollars a month, the carpenter work being done by the members personally. After the first cost they had a trifle over a dollar, which constituted the treasury. Dues were arranged for at fifteen cents a week, with a fine of a cent a day for delinquents. So far not a fine has been imposed. When the new members were taken in, the initiation fee of ten dollars was paid, some photographic apparatus donated, and each new member brought his own chair. This seems rather childish, I admit, but it is practicable just the same.

This is the only photographic club where absolute harmony prevails. Each man is chairman for one month only. The treasurer is appointed for a year, and every week a different subject is discussed. The appointments for discussions are made two months ahead, leaving the subject to be handled by the member as he sees fit. For instance, at one meeting a member brought exposure scales and meters of different makes. All the points were thoroughly analyzed. At other meetings photographic shutters; then blue prints with their modifications; uses of developing papers; comparative speed of plates, etc., and so on, taking up the various processes in photography.

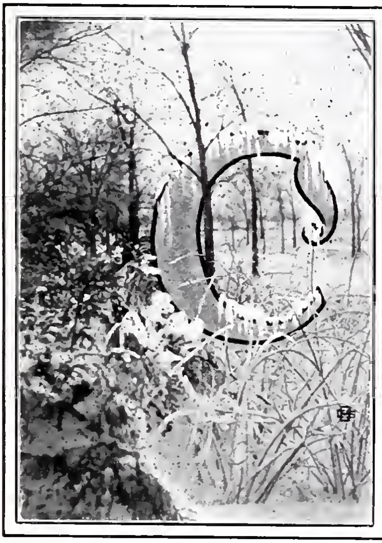
To-day these ten gentlemen are the best informed men in photography I have met. So successful are they that over a dozen applicants are on the waiting list.

At the weekly meetings two visitors are permitted. The member hands the name of a friend to the chairman, who issues the invitation in the name of the club. If a visitor fails to attend, he is seldom invited the second time, as the invitations are eagerly sought for by those who know of the club.

Oliver Lippincott.

SNOW CRYSTAL AND FROST PHOTOGRAPHY DURING THE WINTER OF 1903.

By WILSON A. BENTLEY.



WINTER. Cleo S. Bourgeois.

CONTRIBUTING to the 1903 American Annual of Photography, the writer gave a brief outline sketch (illustrated) telling of the delights of this branch of nature study, with directions how to photograph the snow crystals. When this article was written, our collection of microphotographs already numbered a little over 1000, no two alike, and we were about to enter upon our eighteenth consecutive winter study and photographic work among them. We were awaiting the coming of the winter storms with undiminished interest and pleasure. What would the dark cloud legions of the as yet unborn blizzards bring us in the form of crystal architecture? Would they bring to our camera from that wonderful cloud and crystal land above, forms more beautiful than were ever photographed before; crystal designs more beautiful than were ever pictured in our dreams, or in our most extravagant flights of fancy?

Would the storm artist, by the aid of those wonderful laws of Nature, construct from out those wonderful water molecules that would soon be swarming among the blizzard's dark cloud legions, crystal forms such as were never moulded before, forms unique and strange, or of surpassing beauty and interest, and that would perhaps, by structure, outline, or complexity, throw a new light upon the mysteries enshrouding the life history of these marvelous crystals? Who could tell. Yet the possibility that this might happen, gave an added interest, a greater zest to our forthcoming winter study and search for new forms. As the two preceding winters had been unusually favorable, contributing some 360 new forms to our photographic collection, it might be expected that the forthcoming winter would be unfavorable. This proved to actually be the case, and the winter of 1903 goes on record among the unfavorable ones.

WINDOW FROST.

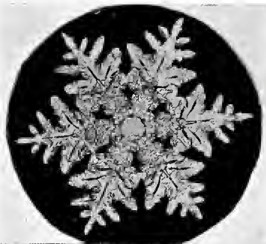
The number of new photographs secured numbered barely 100, and the expectant hope, the day dream that is always present with the one engaged in this fascinating study of finding the one, or the few pre-eminently beautiful snow crystal or crystals that we may be certain exists among the snows of each and every winter's storms failed to be realized and that rare pleasure is deferred, until when? But the winds wafted to our waiting board many a prize jewel, many gems of the "first water" and some of them are equal, each in its class, to the choice ones of the previous winters. For example, No. 948 of December 7th, 1902, contains interior designs so elegant, unique and rarely symmetrical that renders it the peer of any of the more solid tabular forms in my collection.

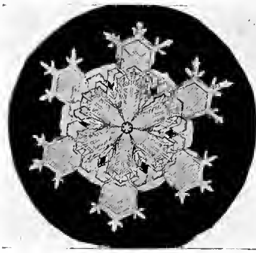
WINDOW FROST.

Nos. 963 to 969 inclusive of January 6th, 1903, are remarkable for the rare beauty and perfect symmetry of their nucleii, while many of those of February 16th, 1903 (see Nos. 993 to 1023), are notable both for beauty of outline and interior decoration.

During each of these mentioned dates a large set (21 each) of photographs of snow crystals were secured, and perfect beautiful forms were so plentiful that it was a rare pleasure indeed to examine each tiny crystal that the winds wafted to us, especially as each tiny messenger brought down with it, safe locked within its beauteous face, a hieroglyphic record traced in dots and dashes, and fairy-like characters, of the conditions existing, and crystalographic processes going on within the cloud or clouds from which each emanated; and how wonderful, how marvelous, that hardly two of all the countless throng were just alike, that so many of those of each succeeding storm should usually differ so greatly from all, or most of those contributed by previous winter storms. This one fact impresses itself upon the mind of the student, more and more, the longer this novel and fascinating study is pursued. Yet, as noted during previous winters, not all were entire strangers, not all exhibited unfamiliar outlines, or interior configurations; for occasionally among the glittering throng, one was found whose lineaments were familiar, and all such were quickly recognized and welcomed as one would an old and familiar face in a crowd. This, very briefly and incompletely stated, is the record of our snow studies for the winter of 1903; and once again we await, with pleasurable anticipation, and hope other enthusiasts who may have entered this fascinating study also await with equal pleasure and eagerness, the coming of the crystal treasures that the 1904 blizzards will soon be scattering over the earth.

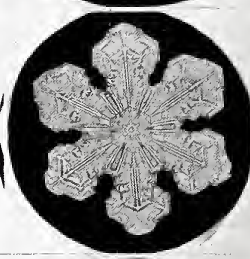
Although the snow crystals are more beautiful and exhibit a more perfect symmetry, than do other water crystalizations, yet the various varieties of frost and hoar frost crystalizations are very beautiful and interesting subjects for the crystal photographers. Unlike the snow crystals, whose whole development takes place in cloudland beyond human observation, the study of the frost forms can be carried on while the crystals are in process of development; and we can note the effects of various conditions, both natural and artificial upon them, and it is possible to secure a photographic record of their whole life history.

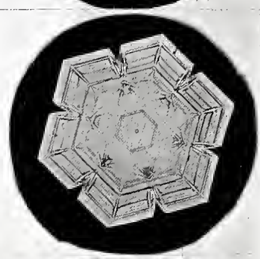




The photographing of them is not so difficult as with the snow crystals and some varieties may be photographed with a small portrait or rectilinear photo lens.

Assuming that the would-be frost photographer has both camera and lens and also a micro-photographic camera and one inch objective, so that the photographing of all the varieties of frost is made possible, the natural query arises, when and where shall suitable subjects be found, and how is the photographing of them accomplished?



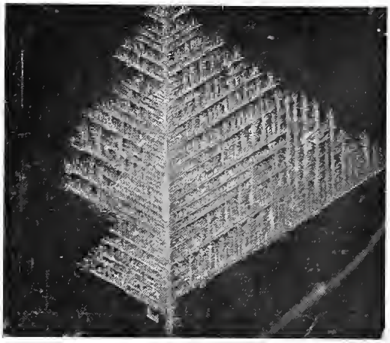


Usually material in plenty can be found out of doors after any cold still night in late autumn, in winter, or early spring. During very cold weather, or soon after a sudden lowering of temperature, the window panes often contain charming examples of the skill of the frost king. At other times during relatively mild, cold still nights the fences and fence posts and various objects lying upon the ground, and the grass leaves, etc., are bedecked with frost jewels. Again, during extremely cold still nights exquisite frost crystal creations arise from the icy surfaces of each frozen pool, or icy terrace, or form upon and hang suspended in beautiful clustering pendants from many of the drooping grass blades, ferns, and similar objects overhanging these icy expanses. The brilliant surface of the ice itself is often decorated with long bundles of clustering icy needles, and even footprints in the snow furnish favorable ground for the frost decorator to show his skill upon.

Assuming that the would-be frost photographer wishes first to secure photographs of the smaller hoar frost crystals, these must be sought for on cold still mornings, and collected upon a black card by brushing them off the objects upon which they form, care being taken not to break them. The crystals must then be placed upon a glass slide, pressed down flat with a feather, and photographed, using a photo microscopic camera in the same manner as with the snow crystals. It will soon be noted that there are two principal varieties of hoar frost, those that are long and often partly hollow, (classed as columnar), and those that form (both solid and branching) upon a thin plane, classed as tabular. It will soon be noted further that one or the other of these types greatly predominate upon any one night, and that the crystals that form upon, and around the edges of objects lying directly upon the dirt, are frequently of the opposite variety from the predominant type. Certain plants seem also to favor the formation of certain types of frost.

Here the scientific instinct should be used, as amateurs may be able to render a valuable service to science by observing and recording the facts regarding the formation of frost upon plants in their localities. Passing to those varieties of frost suitable for the small lens and view camera, the window frost is perhaps the most beautiful and varied.

What delicately beautiful and fairy-like creations; what pictured designs apparently in imitation of forest scenes, or icy castles, etc., the frost artist often draws upon the window panes during zero weather. Some of these designs are so large that they should be taken full size or nearly so. But more frequently one wishes to record upon the dry plate some minute circumscribed portion of the pane of glass, upon which is pictured a choice or unique crystalographic design, and of course a higher magnification than is possible with the ordinary camera is necessary and an extension camera, as extension attachment must be used.



HOAR FROST.

Perhaps the best method of photographing window frost crystals is by the method of oblique light. This causes the outlines and details of the crystals to appear white upon a dark ground. This is best accomplished by placing outside the window, or portion of window to be photographed, and directly in front of the photo lens a large black card, or larger back ground.

The distance away this should be placed from the photo lens depends of course upon the size of card and view to be taken, and should be increased with the increase in size of either of these and vice versa.

Here again, while carrying on this work, the amateur has a fine opportunity of adding to the sum of human knowledge, by correctly observing and recording, both in the photograph and by written data, the facts regarding the frost formation as they appear upon different windows, on different nights, situations, temperatures, etc., etc.

WINDOW FROST.

A photographic record of a single window pane, secured by a fixed camera showing the frost designs appearing upon it from time to time during a single winter, would be of great value and interest. Indeed, this field is quite new and unexplored. As yet we do not know whether in general the frost designs are duplicated from time to time, upon the whole, or a portion of a window pane; whether the designs are traced in depressions or upon raised portions of the glass, what makes the frost form more readily upon certain portions of the glass, etc., etc. From the foregoing it will be seen that this as yet all but unexplored realm of nature affords rare opportunities for original investigations, and charming subjects for the camera of both the amateur and professional photographer.

WINTER. J. R. Peterson.

PORTRAIT STUDY. John C. West.

THE PHOTO-SECESSION.

By ALFRED STIEGLITZ.

W. A. Boger.

COMPLYING with the repeated urgent request of the editor of the ANNUAL for an explanation of the existence and purpose of the Photo-Secession,. the following short résumé may satisfy his readers.

With the growth of art in pictorial photography and the greater importance of photographic exhibitions devoted solely to this branch of photography, there inevitably came that spirit of dissension, jealousy and misunderstanding that seems to be the invariable concomitant of all forms of art. Indeed, it was said that though the artistic products in photography were few, yet the bickerings were worthy of the greatest accomplishments. If in no other way, yet in this, photographic circles had absorbed the contentiousness of the ateliers. Nor was this surprising, when we consider that of all the host of photographers but the fewest were actuated by anything stronger than a desire for glory and notoriety. The advancement of the art was a minor consideration. Much of this spirit manifested itself so unconsciously that many were unaware of the injury that their natural selfishness was doing to the recognition of pictorial photography. Many were purely sordid in their motives, many misunderstood, and many were honestly opposed to those principles that governed the leaders, who through their work had found themselves in the position of directing the tendencies of the principal American exhibitions. Such antagonism as was thus engendered became more and more bitter, until as the most natural thing in the world those of a similar mind and ideals found themselves uncounsciously drawn closer and closer together. Such tendencies work cumulatively, and it followed as the most logical conclusion from such premises that when the time was ripe these kindred spirits would act as a unit. This having occurred, the next step, the formation of the Photo-Secession, was but giving a local habitation—a name to what already existed. Thus was the Photo-Secession evolved rather than born. And in naming it, there was placed on record the protest and antagonism of its founders to the existing spirit and standards that governed the larger photographic organizations of America in matters pertaining to pictorial photography. It was through no desire to injure any organization that the Photo-Secession was formed. It had become a necessity. Indeed, it was but the concrete expression of the right to seek photographic salvation along the path which seemed to this body of men and women to lead to the unshackling pictorial photography from the fetters of conventionalism, tradition and provincialism; though from the bitterness displayed by some it would seem that in photography the independence of the individual was to be denied him. The Photo-Secession as it is constituted to-day denies to none an equal freedom, but strenuously insists that its members have just as good a right to go to perdition their way as others to glory in theirs.

Initially it was but an experiment that would rise or fall by the work of its members and the activity it displayed as a body in furthering pictorial photography. Thus only could the line be drawn between the Secessionists and those in sympathy with them and their opponents. And this was of importance so as to permit those not on the inside in either camp to recognize friend and foe. To-day the Photo-Secession is no longer an experiment, but an accomplished fact. Its success has justified its formation, and, without injury to any existing society or club, it has secured recognition in spite of its consisting of but a handful compared to the hosts of the Philistine. Indeed, many who at its inception misunderstood its aims and ideals, have now become

THE WAY HOME. J. M. Elliott.

convinced that the Photo-Secession is in reality working in a direction tending toward the good of American pictorial photography and that it is only by unity and singleness of purpose that progress can be accomplished. The Secession admits to membership all who sympathize in its endeavors, regardless of their rank as picture-makers, but a jealousy excludes even the greatest photographers, if these are not honestly in accord with its fundamental principles. It is for these reasons that membership has been divided into Associateship and Fellowship, and the latter bestowed only upon such of its adherents whose work in or for photography has entitled them to that distinction; and so strict has been the judgment upon those desirous of Fellowship that it has become an honor not easy to secure. To Associateship all honest friends are welcome.

During the eighteen months of its existence, the record of the Photo-Secession speaks for itself. Besides its own exhibition at the National Arts Club in New York, held in March, 1902, it gathered together loan collections in furtherance of the requests of the following exhibitions: Paris Photo-Club Salon (France); International Exhibition, St. Petersburg (Russia); International Exhibition, Wiesbaden (Germany); the exhibition held under the auspices of *L'Effort*, Brussels (Belgium); Minneapolis Salon (Minnesota); Denver Salon (Colorado); Rochester Camera Club (New York); Toronto Exhibition, Toronto (Canada); Cleveland Camera Club Salon (Ohio). To this we might add the American exhibit sent to Turin (Italy), and which received the King of Italy's special prize and won the plaudits of all critics and connoisseurs, as this exhibit was arranged by the director of the Photo-Secession, to whom the king's prize was officially awarded.

To these exhibitions were sent collections of varying size and representing the work of some fifty individuals and all of which were hung and exhibited as a unit. These collections invariably played a conspicuous rôle in the exhibitions, attracting much attention for their general high average of artistic merit and for the individuality shown by the various photographers represented.

It will thus be seen that the Photo-Secession, by reason of the standing of many of its members, immediately gained the recognition of practically all the principal organizations of the world; and in thus having received recognition as an organization, a thing which had previously been denied all other American organizations, it at once justified its existence. No invitations were asked for and it must not be supposed that merely extending it, would at once be accepted. The terms upon which the Photo-Secession Loan Collections are forwarded are strictly based upon the principles of the organization and an entire acceptance of its terms are a prerequisite. Until recently all invitations conformed to the demands of the Photo-Secession and were it not that it would appear invidious to mention names, there could be cited instances of a declination of most important societies here and abroad. Upon our record, the Photo-Secession, which by the way is purely an American organization, stands ready to be judged by those competent to judge.

EARLY MORN. A. J. Swanson.

G. Edwin Keller.

ONLY A PIECE OF STRING.

By C. M. GILES.

NATIVES. W. H. Anderson.

THE value of most things cannot be judged by their cost, but the worth of an article is generally best gauged by what it will accomplish. By this standard the piece of string or cord that is usually cast aside as of little or no value when taken from a bundle, will at another time become of decided importance. We can all probably remember times when the possession of a strong piece of cord would have saved much annoyance and possible loss of property. To the photographer out on a day's expedition with the camera it will often, if made a part of the outfit, become a valuable accessory. A string with a stone at the end will make a serviceable plumb line that will help to keep the ground glass perpendicular and so prevent those tilting buildings that are such an eyesore in many an otherwise satisfactory picture. Often a stray limb of a tree projects its extremities too far into the view for the good of the picture; attach a string to it, pull it back and tie the other end of the string where it will hold the branch out of the way. If the offending limb is just out of reach tie a stone to one end of the string and with a swinging motion throw the stone so that it will cause the string to wind around the branch. Often a troublesome wind will cause vibration of the camera. Fasten a strong cord to the set screw and draw tightly to a large stone or a peg securely fastened in the ground below the camera. The bicyclist should also always have a supply of cord available as there are many accidents which can be at least partially remedied by its use; and who has not been obliged to leave behind flowers or other trophies which would have been taken home if the string had not been left behind? The cordage takes up little room, adds little to the weight of the outfit and costs only the time and patience necessary to save it when at hand.

Surely all these advantages, with few or no disadvantages, should sufficiently recommend it for a place with every outfit for any kind of an outing.

Many other uses for the cordage will suggest themselves as the need arises and no one will regret having a supply at hand even if not needed.

THE APPROACHING STORM. W. F. Provo.

FIRST PRINCIPLES.

By FRANCOIS VOITIER.

G. Edwin Keller.

OLD photographers were wont to lay great stress upon the *principles* of photography, but is the fear not justified that we are disposed nowadays to devote more study and energy to the *process?* To make principle subservient to process is a somewhat curious inversion not unlike putting the cart before the horse, or teaching a child to run before it has mastered the gentle art of walking. Is an excuse needed for drawing attention to what not a few might regard as an "old-fashioned" phase of the subject? If so, let it be the belief that a sympathetic accord with the thoughts and ideas of the old-timers presages a more intelligent and comprehensive insight into latter-day developments. The process merely consists of preserving the elements of a perfect photograph, not in creating them. Nature provides the picture—the function of the photographic worker concerns the transfer of the picture to a sensitive plate.

What is a photograph? One thing—nothing more, nothing less—a contrast of light and shade. This is the alpha and omega of photography—the beginning and the end—and surely merits careful and sincere thought.

Bearing in mind the foregoing definition, it is patent that failure to produce a satisfactory photograph is due to one of two things—maybe both—that at the moment of making the exposure the light was not falling on the subject at such a strength or at such an angle as to make that subject pleasing in respect of chiaroscuro (the due relation of contrast), or that a natural contrast has been destroyed by faulty manipulation of the plate.

Is Nature always beautiful? Yes and no. She is always beautiful when viewed with the human eye, because even when lacking in the matter of contrasts of light and shade, color and the effects of atmosphere are present to offset any deficiency in that regard, and, too, because of her always prevailing charm. But to the lens Nature is not always beautiful, because this mechanical eye, although well-nigh perfect from an optical point of view, is unable to record those things which constitute her most potent appeal. For the most part dependence has to be placed upon desirable contrasts to furnish a pleasing reproduction through the medium of photography.

Furthermore, noble though the art of photography may be, and indeed is, it never has been, never is and never will be the means of producing a picture of Nature that can give as much satisfaction as Nature herself. Nature is sometimes devoid of contrast, flat, but how beautiful even so; sometimes gloomy, but how attractive in her solemn garb; sometimes bare and barren, but how impressive in her very barrenness!

The basis of photography is light. It is light that enables us to see the landscape, the material things of this world. Light is a contrast to shade, and shade is the absence of light. The sun is the main source of light, and were this source constant in intensity, degrees of contrast would be fixed factors. But the intensity of the sun's rays is subject to the modifications incident to the following of a prescribed course across the heavens, and a continuous exercise of its full powers of illumination is also prevented by the not infrequent interposition of clouds. This explains the variation in the proportion of light and shade in Nature. The absence of shade indicates the presence of light, the presence of shade the absence of light. The more intense the light the more pronounced the contrasts. We see objects in shadow only to the extent that the amount of light present allows us to. If no light were present we could not see them. We do not see light—light enables us to see.

A photographic dry plate is made sensitive to light, for the simple reason that light is the only agent that can and does record the picture. The impression made on the plate is proportionate to the amount of light reflected by the several objects in Nature at the moment of making the exposure in the camera. Therefore, with an undiffused focus and subsequent normal exposure and development, a negative should, in like proportion, under the technical names of density and transparency, represent the contrast of light and shade that existed in Nature. This does not allow for the incapacity of the ordinary plate to truthfully record the eye-value of objects of certain colors, it is true ; but this phase of the question more properly belongs to the subject of orthochromatics.

In that a misunderstanding of "first principles" is responsible for not a few failures; might it not justly be assumed that an understanding of them is responsible for not a few successes ?

Mrs. W. W. Pearce.

A SUMMER SEA. Rudolf Eickemeyer, Jr.

THE CAMERA IN ORNITHOLOGY.

By GENE STRATTON-PORTER,
Author of "The Song of the Cardinal."

SCREECH OWL WITH ONE EYE CLOSED.

IT is a long stretch of time from the compilation of our American Ornithologists' union charts and descriptions back to the days of Pliny, who divided all birds into three families, "those that have hooked tallons as Hawkes; or long round claws as Hennes; or else they be broad, flat and whole footed as Geese." In this period the work among our birds, at least, has been well accomplished. Specimens of perhaps every one of the seven hundred and sixty eight subjects of this union chart have been killed, drawings made, skin mounted, frame articulated, intestines measured and peculiarities noted with scientific accuracy. Haunts have been described and all these rapid fire methods of observation could tell of characteristics recorded for our benefit.

This work has been so thoroughly done that any moderately bright person can identify any subject that he will find, no matter how rare, by these union charts and descriptions. It was a class of pioneer work on this subject that was necessary and it has been accomplished with a completeness that deserves all commendation. To be sure there are slips, but they are so few and unimportant that the person feeling called to thresh this same ground over must be scrupulous indeed, and willing to inflict endless cruelty and suffering on the birds. The writings of ornithologists conducting their investigations alone, cover volumes I have not stopped to count, but all I have ever investigated were fair work and of sufficient accuracy to fulfill their mission.

What happened to millions of our most precious birds while all this host of workers was gathering scientific details for their volumes can be pretty accurately gauged by the one writer who complaeently states that he shot fifty eight rose-breasted grosbeaks during the space of three weeks in the breeding season in order to make a record of the contents of their crops. I do not think by any amount of travel he could find the same number in the same length of time at present. It really looks as if this energetic old

FLYCATCHER NEST AND YOUNG.

school worker expected to find these exquisite birds filled with potatoes instead of potato bugs and raises the grave suspicion that the millinery trade is not wholly responsible for their present scarcity.

These workers have certainly placed their writings above the necessity of repetition. I fervently hope so, but it must be admitted that the method of illustrating these productions up to the introduction of the camera for this purpose cannot be placed on the same firm basis. I have been carefully studing the illustration of what is perhaps the best selling work on birds on the market to-day and I find it little short of caricature. In no single instance is any bird given that is perfect in every detail of expression, outline, markings and coloring.

Two of the worst breaks of the illustrator of this volume are to be found in his cardinal and his kingfisher, birds that are very difficult to draw properly, I grant; but it does seem that a bird so common as the cardinal should not go upon record with a crest that flares three-fourths of its height and then turns and bends down, beak incorrectly drawn on bridge and edges and wrongly hinged, bright red eyes and a coat of impossible brilliancy. The kingfisher is worse as to outline, his beak lacks one-fourth of being true size, his crest fully that, his collar is one-half too narrow, his breast band circular instead of V-shaped, the corners of his mouth fall too far front, his eyes are much too small and his coloring and pose extremely faulty. These birds have beautiful big liquid eyes and the corners of their mouths fall directly under them.

When any ornithologist goes into the woods and shoots a specimen, which is the customary way of securing them, he can deal with its members with absolute accuracy; but when he sits down and with brush or pencil tries to reproduce his subject, accuracy falls short and we get only the best his art is capable of producing, not the thing as it is. Of course only specialists in bird work detect all these mistakes in form and coloring, but it does seem as if just plain, every-day bird lovers ought not allow a bird with the piercing dark eyes of the cardinal to be reproduced for them with optics of bright red.

It is in color alone that the camera fails to surpass handwork in this branch of illustration. This is serious. To be perfect, ornithological studies require color. But if it becomes a question as to whether we reproduce our subjects with absolute fidelity to form, marking, expression, pose and location and lack color or to some artists faulty drawing add color all too frequently inaccurate, there is only one view to take. It is far better to sacrifice color and give accuracy in every other detail. Form, markings, expression, pose and location cannot easily be described. Colors are so classified and named even to the most delicate divisions of shading that if you can reproduce the exact shape and marking of a bird you can describe its color accurately.

However, I think we were all fairly well satisfied with the old methods of illustration up to the introduction of the camera for this purpose, but scarcely had it made a fair entrance into the field until the world began to laugh. Just at the time when the miracles and wonders of cameric ornithological illustration were being made apparent to an astonished and delighted world, a great Chicago daily began reproducing in its Sunday supplement the bird drawings of Audubon.

People had just grasped the fact that it was possible to have likenesses of living birds exact in form, plump, full-breasted and bright eyed. Birds with their members properly placed, every feather clean cut and with characteristic surroundings. The added knowledge that the little subjects were in no way harmed was a joy that equalled the exquisite studies to many. Here were birds singing in ecstacy, rollicking in play, feeding their young, cooing love, fighting, fleeing in fright, crouching over a feast with a face of miserly greed, and it could be attributed to no deft turn of the pencil or trick of the brush for it was plainly to be seen that they were living subjects as they flashed before the lens working out the comedy or tragedy of their lives.

And to our delight at these perfect studies of our bird friends was added another thing that pleased us almost equally, a thing at which we never before had even a passable attempt, perfect reproductions of nests and eggs. The most finished productions of brush and pencil become stiff and crude beside the accurate and exquisite work of the lens on these subjects. Here hand workers were even more helpless than on bird drawings. Now we could have nests with every intricate bit of twig, root, bark, grass, moss covering, down lining, weaving, mud building or tunneling just as arranged by the deft little architects, often with leaves, flowers, fruit or nuts almost touching them, and the lichen covered limbs, rails, hollow trees or branches that sheltered them exactly reproduced.

Then came the bird babies and the world lay conquered. Hand workers had realized their limitations sufficiently to let these charming little bright eyed balls of fluff and down alone. When cameric reproductions of them began coming one great cry of pure delight went up all over the world. The most stubborn sticklers for handwork gave in and artists of the brush and pencil by the hundred bought cameras and rushed afield to learn how this thing was accomplished.

Just then came these drawings of nests and birds by Audubon and these studies that we had always reverenced

YOUNG ORIOLE AND NEST.

as almost sacred suddenly looked dead, flat and stiff, much as if they had been drawn from mounted subjects or cut out with a scroll saw and these nests resembled nothing so much as a lively young whirlwind of sticks and twigs. Audubon's text will be given a high place among authorities for all time, I have no doubt, but his drawings as opposed to cameric work are caricature. More recent workers have surpassed him in craft and given us more graceful and life-like illustration, but the finest bird drawing I ever saw I could make look travesty with my lens on the same subject.

When any ornithologist goes into the haunts of a bird and discovers new material, what he wants to do is to describe and to reproduce for others exactly what he has seen. There is no medium to equal the lens for this purpose. It is modelled after the structure of the eye and was originally invented to record for others exactly what its operator saw. In natural history reproduction this is the effect for which to strive. It is right to give all the art and beauty possible as accessory, but first, last and all the way between, truth and accuracy should be the goal for which to strive. There should be no subterfuges. The line should be sharply drawn between fact and the play of a lively imagination, in bird literature and between some one's best attempt at a reproduction and the thing as it really is, in illustration. If there is no other way to arrive at a clear understanding writers and illustrators should label their work fact or fiction, as the case may be. If they are giving facts, let them say so and establish a reputation for truth and veracity. If they are telling a story with literary values as the end to be served, then label it a story and have done with it. I find such crass ignorance existing among the masses I meet every day in field work that I feel it is cruelty to impose on the credulity of simple, honest folk that are really most anxious to know and lack the years of patient study required to enable them to separate fact from fiction for themselves.

I have been so impressed with this idea in reading up the mass of ornithological matter now being put before the public that it has bred in me an extreme care. In my staff work on "Outing," in work for the Almanac or any publication, I have always expressly stated when I was giving facts, to the best of my ability and when I was telling a story. In my first book, "The Song of the Cardinal," which is not yet published but will be before this article sees the light, in making up the preliminary pages I expressly stated that it was a story. I did this because I wished to picture the life and love of one pair of birds so humanely as to arouse sympathy for all bird life and love. So in telling the story I followed the popular conception of bird life. I hatched the bird in a swamp, gave him a young playtime, sent him migrating, had him return in the spring, find a mate, nest and bring forth his young as all birds are supposed to do. I did this with an eye solely to the literary values of my book. I could not bring myself to leave out the dramatic figure, the cardinal cut, sweeping the night sky with his crimpson body in a thousand-mile plunge of flight. As a matter of fact, cardinals do not migrate in my locality at all and if they did would be classed among the walking migrants. But I wished to make this bird's life and love typical of all life and love, and most birds do migrate, so I sent him south and expressly labelled the book a story as the result. The facts in the case are, that, barring this one statement, that I wrote for effect and not for truth, the rest of the book is the record of the acts of these birds reported exactly as I should have interpreted actions of a like nature in a couple of human beings. I was frequently hidden by the day, only a few feet from them and I set down their story exactly as it appealed to me and the illustrations of the birds are every one from free, living subjects, that could fly or stay just as they choose. I frequently blocked out backgrounds, leaves and limbs to emphasize the beauty, pose and expression of my subjects, but not a feather on one of the birds is touched. They are the work of the lens, pure and simple, and in reading this story and examining the illustration there is no necessity for any one being misled.

There is this fault to find with new school bird writers, that they have not been as scrupulous as they should in separating fact from fiction, and I have looked for the merry war that is now raging between the old and new school workers for many a day. In this pitch battle I am compelled to range myself on the side of the new school workers because their experience is mine also; but I wish to add the proviso that I will always tell my audience when I am giving them natural history and when I am romancing, as I always have done heretofore. John Burroughs was never more eminently correct than when he said that even a child should know when you were giving him facts and when fiction. It appeals to me that the children, first of all, should understand this matter clearly. There is no reason why exquisite fairy tales of bird and animal life may not be written with rare literary value, and intensifying our understanding of bird and animal life and love; quickening and broadening our sympathy; but it should be clearly stated that they are fairy tales.

PHOEBE NEST.

To me the crux of the matter lies in this—that old school workers labored to establish species, and families, and produce such results as the American Ornithologists' Union, Studer's birds of North America or Audubon's bird book. The new school realizes that this work is so thoroughly and so scrupulously done that there is no necessity for its repetition; but there will always be men and women of every day and generation born with a call to the fields in their hearts and they will always respond beeause the urgings of a nature lover drive him without ceasing. If we young people do not need, re-locate and classify the birds, what is left us to do? What indeed, but what we have done; enter their private life, invade their home circles and learn their individual characteristics and habits. And in entering blinds, set up only a few feet from bird homes and by the hour, day, week and month even, studying their habits in the hope of securing reproductions of them in characteristic

COL. B. B. F. STONE. Paul R. Morrison.

locations it has happened that this new school of bird workers has discovered what was not known until recently, *that one bird no more represents the whole of his species than one man represents the whole of his race.*

This fact was first discovered by a few present day writers just previous to the advent of the camera in this field, and they came from years of intimate experience in the woods and told their stories and with skilful fingers illustrated their text and immediately old school workers began to sneer and say some very hard and very narrow things. It is so easy with a deft twist of the pencil or stroke of the brush to record an attitude or expression that never existed. And because these old school workers, who are big, broad men and accustomed to dealing with the scientific, anatomical side of the question, had never dreamed of the intimate studies of private life of individual species that were being made they laughed and straightway damned both text and illustrator. Right here naturalists that go into the woods equipped with cameras and accurately reproduce subjects and discoveries they wish to discuss have their inning. There are no deft twists and turns to the lens. It must of necessity reproduce what is before it precisely as its operator focuses on it, and so long as any bird writer comes before us with a story to tell and can produce a clean, sharp print, obviously from a free living subject to prove his assertions, the laugh falls short. You are up to a fact that a court of law will accept and facts are ugly things to explain away. No one can say of a print as they did of these bird drawings, "How he humanizes his subjects"! If a print is humanlike it is because a bird was humanlike in front of your lens and it was your good fortune to make a record of it.

In my collection, embracing hundreds of natural history plates I have almost every expression that ever crossed a human countenance pictured plainly in the face of a bird. I have birds cooing love, fighting, in full tide of song, with faces of miserly greed, screaming in anger, lolling in the sun, frightened until their eyes fairly pop, feeding their young, in fact working out almost the entire human psychology dressed in feathers. In three cases I have made a complicated series, one of which involved daily work for six weeks, another three months and the illustration of my book is the result of three years' work about the haunts and homes of these subjects. During April, May, June and July of that period I have worked almost constantly over them. I have no record of my failures. The illustration of the book tells only the story of my successes. There is no hint in it of the subterfuges to which I was compelled to resort, the days of utter failure, the dozens of spoiled plates, the wasted hours in the dark room and the worn sun-baked body I could scarcely drag home at night. But when at last the book was ready to go to press I had a cardinal with his throat swollen in song, taking a sun bath in a shower, singing on a branch of an orange tree from my conservatory worked into his surroundings, pursuing his mate in the stress of mating fever, a brooding hen, her mate beside her, the nest and eggs and the young, and if you will closely examine the pose and expression of the birds of these studies you will find that the lens has recorded exactly the feeling I attributed to my subjects at the time the exposure was made.

Now suppose you brush my text aside as too human and lifelike to be credited, what will you do with the illustration? There is not a stroke of retouching on one of these bird plates or on the bird in the prints. They are given exactly as the lens saw them. The real truth is that the illustration and the chapter heads tell this story and until some other person can bring records to prove that he has lived with and among this species until he can produce like results, I will maintain that he is not in a position to criticise my statements because he does not know these subjects as intimately as I do and he ought to be big enough and broad enough to admit it.

If any man or woman makes a specialty of any bird subject and discovers new and unusual things it does not in the least lessen the credit of the man that first discovered the species. As Schley said at the close of his great victory, "There is glory enough for all." It is a hard thing for one man to know all and have all the experience there is to have even with a very common subject.

I am satisfied in my own mind that there is no one cause so potent in the discussion now raging as the camera, and the accurate and intimate knowledge of bird subjects that being hidden, crouching in a blind by the day, waiting for an exposure, brings to its operator. There has never been anything like it in the history of the world. It ought to be

BLACKBIRD NEST.

expected that it would develop new experience and bring to light new knowledge. It is certainly not unreasonable that it should.

Right here comes to my mind a sharp parallel between the methods and results of old and new school workers. I have laid aside to illustrate this article a study of a bittern. I selected it thinking how impossible it would be for brush or pencil to reproduce such a study with the delicacy and exactitude of the lens, but as I write a new thought comes to my mind. Audubon stands well to the front, if not first of old school writers and illustrators. Once upon a day Audubon met a bittern and in his work you will find his account of it.

"That they are extremely timid, I well know, for on several occasions when I have come suddenly upon them, they have stood still from mere terror, until I have knocked them down with oar or stick; yet, when wounded and their courage is raised, they show great willingness to defend themselves; and if in the presence of a dog, they never fail to spread out, to their full extent, the feathers of the neck, leaving its hind part bare, ruffle those of the body, extend the wings and strike violently at the enemy. When siezed, they scratched furiously, and endeavor to bite, so that, unless great care be taken, they may inflict severe wounds."

If the bird had not been terrified, that it stood still until he "knocked it down with an oar," then he would have shot it, as was his custom and proceeded as before. But you say this was necessary. You must sacrifice specimens to establish facts and species. In some cases I grant it, but not in this. The bittern was "established" on a half dozen good authorities long before the days of Audubon. It was completely exhausted anatomically in France years before. Audubon may have had a curiosity to see for himself, but he knew perfectly that he would find the membrane that enables it to boom and the small peculiar intestines. He would have been eminently safe in quoting established authorities, but it was his method to see for himself. After he had established his inside facts, he wounds and torments the bird to a frenzy to test its fighting qualities, and further finds it necessary "on several occasions to knock it down with an oar" merely to prove that it is in his power to do so. May heaven preserve me; no, may heaven preserve the birds from further ornithology of this sort.

The other day I met a bittern and I could have knocked it down with a tripod or picked it up in my hands and dissected it to my heart's content but these facts, so well established, made no appeal to me. I was just as sure of that bird's inside as I was of its outside. Instead I donned my waders and entered the swamp that was its home. set up my cameras and reproduced its location, its nest, its eggs, the brooding bird, her mate in his favorite fishing grounds, their haunts about the swamp and the lane leading to it. These studies are exquisite. I have never done finer work. I had every opportunity to place my camera as I chose and I used slow plates and time exposures, even on the birds.

I could have killed the female fifty times over. She was so burned with the brooding fever she sat perfecty still while I operated on and about her and trimmed the grasses away up to a few inches of her in the foreground to emphasize the shape of her nest. When I parted and bent them under water to make an exposure on her she stuck to her eggs and peppered me with her hard sharp beak until my hands and arms were wounded in a dozen places and dripping, but, mind you, it was not the bird that was hurt. She was doing the execution herself. When it came to an exposure on her eggs I was compelled to lift her from the nest, wade ashore and have an assistant hold her while I worked, which I did with all the rapidity possible and then carried her back, replaced the grasses as nearly as I found them, and left her still on her eggs and wholly unharmed.

I think I spoke of a parallel. It was a parallel case but not parallel methods. Here is the difference. Audubon met a bittern and tormented, wounded or killed it, either to reprove facts a long time established or merely to prove that he could. I met a bittern and made five separate trips to its home and it was a fourteen-mile drive and swamp work; but there are those beautiful likenesses, covering the most interesting period of a bird's life, from which I can illustrate an article so intimately and so accurately that all who read it will be influenced to give this, and all other harmless birds sympathy and protection; and the plucky little mother is still brooding as I write and I am still travelling those fourteen miles every few days hoping to be able to add her chicks to the completion of my series. That there is necessity for finally killing her to add scientific details to my article I emphatically deny, for I can quote a half dozen unimpeachable authorities as to these details. But nowhere else have I ever seen anything like the completeness and beauty of my studies of her and her haunts or any account so intimate and human as that I gathered notes for while I worked and watched over her in securing these reproductions, that will certainly be required to prove my statements.

Now, whose meeting with this bird is going to mean most to the bird and its species, or to the knowledge and

SNAPSHOT OF CARDINAL IN FULL TIDE OF SONG.

interest of people working along these lines or seeking amusement and instruction? And if, as I make trip after trip to her location, study she and her mate, by day and by night, learn their habits, invade their home life and secrets and tell of them these scarcely believed things that I have my illustrations to prove, what about the old school-worker that pops up and says this must all be a lie because he and none of his class of workers had ever recorded observation so humanlike and intimate ?

In a recent condemnation of the greater part of new school-writers and illustrators and the work they are producing, John Burroughs says that Audubon roamed the whole country over and had nothing that came within gun-shot of what appears to be these new school-workers' daily experiences. It is quite true. Could anybody guess the reason ? No living man or woman can come within gun-shot of a new school-workers' daily experiences with a shot-gun. These knock-down, slay and kill methods are a world-width removed from the means by which new school-workers obtain a class of material that Burroughs maintains exists in their minds only. I have here recorded what Audubon accomplished in his meeting with a bittern, "on several occasions" told in his own way. In the light of previous knowledge of this bird, to what does it amount compared with my series of exquisite prints and the intimate notes recorded while making them ? Does any one wonder that the present world-sweeping wave of ornithological enthusiasm was not wakened by such records of bird-life as this oar incident.

Because I do not recall just where I read it, and cannot quote literally, I will not name the author but I recently read of a man that aspires to be the leader of old school ornithologists taking a walk very early in the season and finding the nest of a hare. He minutely describes how he kicked the nest to pieces because he had often heard that a mother hare will strip the fur from her body to cover her offspring and he wanted to see for himself if this was the case. He saw. It was. Returning later he passes near the spot and stops to see if the mother has come back and repaired her nest. She has not and the babies are frozen stiff. How the babies enjoyed this freezing process and how the mother that bared her breast to cover them felt when she did return is not recorded. I presume it was all purely "instinctive." But this writer had proved for himself a fact that one-half of the schoolboys of the day know and that has been recorded by reputable authorities, for, say two or three centuries.

If Mr. Hord would only allow me a little bit of space, I would be delighted to show you what happened to both the mother and the babies the time I found the nest of a hare and so far as my dealings with them are concerned; they are all enjoying all that a rabbit may at this hour. The studies I made never fail to set any one that sees them into ecstacies of delight and they are to be highly honored

MALE CARDINAL IN PURSUIT OF A MATE HE COVETS.

in a great scientific work now in the course of preparation. Surely, in the libraries of the world, these studies of mine are going to serve a purpose so infinitely greater than was achieved by the freezing of this family of babies that there is no comparison.

I could keep this up for the length of this volume. But is it necessary? Surely my point is proven!

No man or woman is capable of sitting in judgment on a class of work they have never attempted. In the ornithology of men that repeatedly knock down a bird, helpless from fright, to prove that they can, or kick open the nest of a hare to see if the mother really bares her body for her babies, there is never a gleam of the impulse that hides a worker crouching in a blind every day for weeks, hanging almost breathless on every movement of a subject he is trying to learn of and reproduce. It is not the least wonder to me to see that these old school-workers do not understand, and are not prepared to credit, the work of the new school. I freely confess I do not understand and can scarcely credit their own accounts of their bloody work. Their methods are as different as the ends they strove to attain. They were

BITTERN.

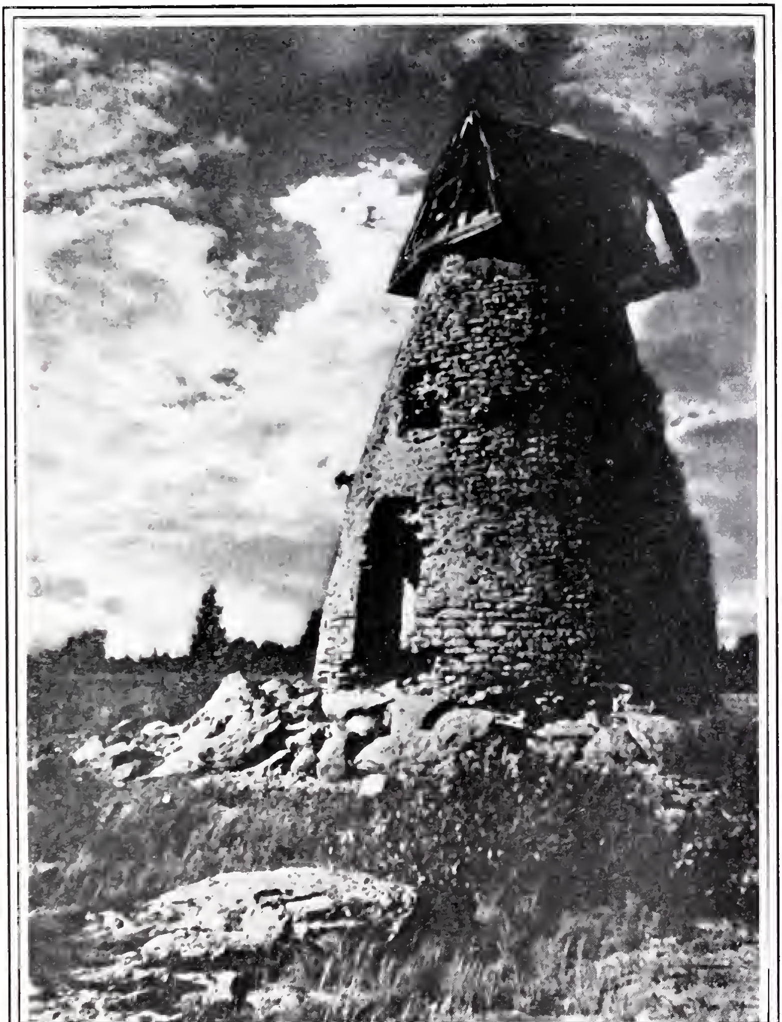
trying to cover the whole bird family and they never could have gone over one-tenth of the ground had they given the time to individual specimens that a new school-worker does. The old school generalized. We are specific. They classified; we individualize. There is a vast difference, and I notice that in a hundred years of this work on species and families, the world never woke up to an honest love for the birds and the necessity for their protection that new school, workers have aroused in ten of their intimate and specific work.

I do not know to what extent birds can think, reason, plan and feel. Neither does any one else for that matter. I do know that they exhibit to a degree almost the entire human psychology and have so recorded on my plates. I have seen an emergency arise and watched birds reason out a way to meet it. I have seen them make a plan and carry it out successfully. I have seen them exhibit grief, in comparison with the little time they have, just as real and lasting as a great deal of human grief. Had I space I could give illustrations to prove most of these assertions.

These displays of brain power are crude and rudimentary of course, but they are so strong that I have been so filled with amazement at times that I have scarcely had presence of mind to make an exposure at the right instant to record what I saw.

It is not possible for these old school workers to brush aside the records of the lens as they do those of brush and pencil which is an added reason that equals its exquisite work for its use in ornithological illustration. And if our intimate reproductions and writings of bird-life are not understood by these shooting, knocking, kicking ornithologists of the old school it is vastly more to their discredit than to ours. To any naturalist making a specialty of any branch of study, I would say use the camera for your illustration. Touch it reverently, it will *prove* your assertions; master it to its utmost possibillty, for it is in your hands the most successful method known by which to show to others exactly what you have seen.

HARE AT ENTRANCE TO NEST.



THE SENTINEL. Ulysses G. Orr.

A PLEA FOR THE COMMONPLACE.

By W. E. BERTLING.


CLAM DIGGER. James Shepard.

IT is a curious fact that when many photographers have worked along certain straight lines for a term of years they suddenly deviate from the consistent and strive to produce all manner of strange variations and seemingly confusing parodies of a legitimate subject. Apparently it has become the style—and fashion rages as much in photographic circles as in society—to delve into the abstract, to confuse, to mystify. This has been carried to such an extent that the commonplace admirer of pure photographic work must ask in fear and trembling if yonder conglomoration of bichromated mass is representative of landscape or marine, portrait or interior. The subject is shrouded in deepest mystery, and this chaotic structure composed of pigment superimposed upon an abused sheet of good paper is calculated to impose itself upon the observer as "real art."

The "wise" individual whom you interrogate condescendingly informs you of its merits—and well he may, for there are no foot notes appended to the picture—he tells you about serpentine lines, atmosphere, central features, feeling, composites, and in fact enumerates all the symptoms with which this diseased work is afflicted. You may have a sufficient amount of physical endurance with which to withstand this strain upon your faculties, but your chances may be improved by taking a little healthy exercise and plenty fresh air afterwards.

"Faddism" is the altogether too prevalent element introduced into present photographic circles and the feature probably originated in the case of some one individual who accidently "constructed" an "art creation" that puzzled the salon experts to such an extent that the verdict was: "Well, hang it up anyway and let the art maniacs determine its merits." Consequently it was hung, not morally hung, or even as it should have been hung, showing reverse side outward, but nevertheless hung, hung good and proper, glaring defiance at the good legitimate work.

Then came the mad stampede of tousle-topped fanatics to pore over the work and curiously enough espied the "art creation" at once, because it was so different from anything else. Being a picture of such character that it could represent almost anything, it followed that almost any criticism was safe, and no doubt its "fine points" are being discussed to this day.

Such, however, is merely my theory; likely enough it is correct, for "faddism" has grown to such an extent that confusing photographs have become quite as much the rage as confusing signatures of bank cashiers. It is to be deeply regretted that the odd, the hazy, the bichromated mystery, printed from a poorly exposed negative, should be given precedence over the pure, wholesome offspring of straight photography.

Not only have we lost sight of the commonplace in our picture producing mediums, but our sense of selection and treatment of subjects have suffered equally. Commonalities are always interesting; the small things, the things that enter into our every-day life and that are so familiar to us, that the sight is good to the eye, even as the home is after a long absence.

By this I do not necessarily mean uninteresting street corners, lampposts or shop fronts; I make reference to the many bits of simple country life, the pasture, the highway, the shore, in fact all of those out-door scenes which, by nature of being commonplace and accessible to all, have become dear to us. It is in such environments we invariably find peace, restfulness and harmony. Nature not only makes her pictures interesting to the eye, but she so delicately variates them that no view of the same place is ever twice alike.

To say the least, it is a most discourteous proceeding to misrepresent nature's landscape, to introduce the short focused, hazy, ragged features so often seen in "art photographs." I think I am perfectly safe in stating that no man ever gazed at the fields or the meadows or at the stream and saw fringe upon the distant hills, blur in the foreground or wool in the water, unless his eyesight was defective. In such a case it would be more charitable to consult an oculist than to take advantage of the misfortune and impose "art photographs" upon the suffering public.

Why not break the thraldom of the present "fads" which are so oppressive? Why not break through the bars and seek the pastures of our youth to breathe the free invigorating atmosphere that surrounds the pure, the legitimate, the commonplace photographic reproductions of long ago?

Why not steadfastly denounce the picture mysteries so often presented to our eyes and exterminate the over-saturated fanatic whose incendiary idiocy has caused such havoc in our ranks? He should be removed three degrees further than the tall pines bordering the distant hills!

A pure photograph is not necessarily a colorless, microscopic, hard reproduction; there is always room for individuality and manipulation in printing methods; the point is that when introducing effects which are not in the original plate, handle these factors with such care that when the finished product is shown it will represent nature to best advantage and in a most favorable light. The majority of us have insufficient time at our command to make an extended stay in a certain portion of the country and await favorable conditions, but it is in the reach of any one to make several exposures both for composition and sky and then combine the best features of both.

There is always a normal intermediate stage in any kind of work, a stage that is wholesome, legitimate and commonplace. Extremes are always short-lived and in the long run unsatisfactory.

In photography we have the crude or microscopic stage, wherein the amateur seeks only to produce hard negatives and any kind of a print that will yield as much detail as it has been possible for the lens to have supplied in the negative. We have the middle or normal stage that is only reached after having passed unscathed through all others, and wherein every effort tends toward producing a picture of absolute value, consistent with itself and nature as well.

In the extreme again, we have the stage of mystery, doubt and confusion. Here distortion rages rampant, reason is trampled under foot, fidelity to true photographic principles is crushed and nature held up to ridicule. It is a condition to be deplored, not only because of its antagonism to true principles, but because the germ of this contagion has spread so alarmingly.

Let us organize ourselves into a corps of workers determined to fumigate this atmosphere of mist, clouds, mystery and depression; open the doors leading to true landscape, sunlight and pure atmosphere. In plain words, let us go back to the consistent, the commonplace.

We should pay no heed to the art crank, he of the shaggy hair, the slouch hat and flowing tie. Let him simulate what attitudes he may, let him blazon forth his art jargon as blatantly as his lusty lungs will permit; his days are short, for the time is coming when we will soon have the courage of our convictions and produce photographs that are realistic, cheerful and pictorial.

THE COMING STORM. Jno. M. Schreck.

Mrs. J. E. Bennett.

IN THE BAY WINDOW — Mrs. J. E. Bennett.

IDEALS.

By CARL RAU.

SHIRLEY POPPIES. W R. Atkinson.

THERE certainly are ideals and ideals, and the photographer can lay claim to at least a share of them from the country "artist" up the ladder to the "pictorialist" who is clambering high above at seemingly dizzy heights.

One may actually possess an ideal camera, another an ideal lens or an ideal plate, developer, printing paper, etc. — may hold on to them for years and finally discard them again to make room for new ones and these in turn will only meet the same fate during the relentless flow of time.

But we will not waste any regrets over ideals such as these, but look a little higher for something of more value.

Referring to the dictionary we find that ideals "consist of, pertain to, or exist in ideas," and Ruskin defines the meaning as "works of art, representing not a material object, but the mental conception of same."

Then again we find definitions in connection with art as "Exceeding ordinary reality, refined and imaginative, fancied, visionary."

To us it would seem that the ideal varies according to character, temperament and environment of the individual. The savage has his visions, his ideals, very real to him, however crude they may seem to the more civilized being.

The peasant has his ideals, so has the merchant, the capitalist, the professional man—they may be rather material, but still they represent the outcome of their particular drift of thought of their environment, their ambitions.

Ideals are, perhaps, as changeable and fleeting as the dictates of Dame Fashion. We may hold fast to one ideal to-day but by to-morrow we may possess new light, newer experiences, more knowledge, and our ideal will be quickly tumbled from its pedestal and replaced by something higher, better—perhaps—but yet, not always.

But to come back to art and photography, we find that our brother artist, if he is a poet with the requisite skill, has the power to bring the ideal within his reach and leave it to the world as an heirloom. But the photographer, let us say the pictorial one, what is he to do—he may be a poet as much as the painter, but how is he to solve the problem with the aid of his particular tools only ?

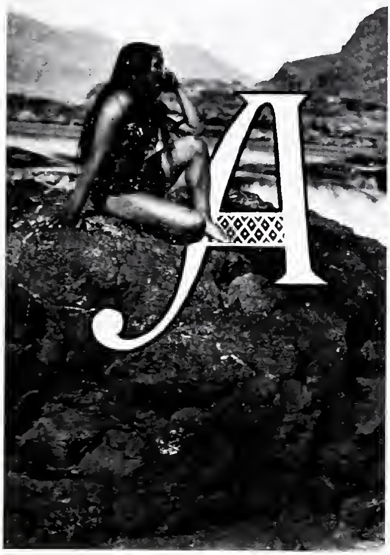
He may patiently search, watch and wait, perchance at long intervals he will suddenly, as if by magic, find the landscape under just the right light, with just the right mood, the proper composition, the very picture of his dreams, his ideal presented momentarily, and if he is ready to seize it and has the required skill, may make it his own. Again, he may have a vision of a face, a fleeting expression, perhaps in a crowd of strangers—our brother artist might be haunted by it and finally conjure it up again on his canvas by the power of his vision; but how about the photographist with all his wonderful tools and chemicals, but with just the one faculty missing, the most important one, of isolating his vision and holding it fast on the photographic plate?

He may even be fortunate enough to obtain the face before his camera, but the expression has vanished and the face without this magic touch is the ideal no more. Or again, the face has some imperfection which the most careful posing and lighting cannot correct. The painter poet has caught the important parts and can work up the details according to his will—the camera produces the image mechanically, without the filter of the mind, and what becomes of the ideal ?

But after all ideals are elusive and shadowy things, and we wonder if any one has ever attained them fully.

INDIAN PHOTOGRAPHY.

By LEE MOORHOUSE.



Lee Moorhouse.

ALMOST universal use of the camera and kodak, by all classes of people, and in all imaginable lines of work, including literary, journalistic, historical and advertising, has served to familiarize the Indian somewhat with the art and novelty of photography.

Even yet the artist finds it extremely difficult to secure a good line of negatives representing Indian life in its original picturesqueness. To obtain their consent to be photographed in their home surroundings requires a great amount of time, patience and tact in dealing with them.

Superstition is one of the component parts in the Indian character. They look on the camera as "Bad Medicine" because they cannot understand the process by which a dry plate is put in the box and an Indian is brought out. They shake their heads, shrug their shoulders and grunt their disapproval of its mysteries and often absolutely refuse to face it even after long and tedious explanation and persuasion.

This rule does not apply in all cases. Indians have strong individual characteristics and remarkable qualities of mind. If they once come to place confidence in a white man; if they make a complete surrender of their welfare to a "pale face," that man can wield a remarkable influence with them. Where the old Indians have implicit faith in

SEES-YUSE, HEAD MEDICINE MAN OF THE COLUMBIA RIVER TRIBE.

the owner of a camera, where they know him personally through long acquaintance, they are inclined to listen to his explanations and accept his assurances that the camera is not "Bad Medicine"; but the same camera in the hands of

THE FAGGOT GATHERER, UMATILLA RESERVATION, ORE.

a stranger or a man in whom the Indians do not place complete confidence would be turned from in dignified disgust.

However, there are instances among the Indians where the prejudice against the camera is too deep-seated to be overcome by friendship or money. The superstitious fear it inspires in these is not to be toyed with. For instance, I tried to get one of the most prominent Indians in the Northwest to sit for me a short time ago, but he flatly refused. For 25 years I had known him and enjoyed his confidence. He was getting old, was somewhat enfeebled, and as much of the very life-threads of Northwest history were woven by him and his forefathers I was particularly anxious to secure a good negative of him. Love, money and persuasion failed.

A young Indian who had just returned from school and who had listened to the conversation between this obdurate old fellow and myself said to me, "You know why Five Crows no want his picture took"?

I replied, "No, Red Elk, why is it"?

"Five Crows think if he has picture took, he go to h—— sure," was the astonishing repry. But many of the Indian tribes have caught the white man's touch of vanity and some few of the old fellows and many, many of the younger generation can be seen loitering around the studios, admiring the photographs of friends who, dressed in their gaudiest robes and ornaments, had submitted to a sitting for the artist. After an old Indian once gets the photographic fever, and is encouraged by an artist in whom he has confidence, the old fellow will take pride in arraying himself in all the tribal regalia and ornamentation at hand and will sit a dozen times a day. But this specimen is very scarce. Indians have a greater horror of the small kodak than of the large camera. If an artist wants to find serious trouble, all he need do is to take a small kodak and go among the Indians in their camp, snapping promiscuously at tepees and Indians without permission. He will soon be informed that his presence is not desired. They can grasp the possibility of something wonderful being confined in a large "box," but that an equally wonderful thing could be inclosed in a pocket kodak is beyond their comprehension and its presence at once arouses their superstition.

Not long ago I went to the camp of a Umatilla family with whom I was well acquainted, and on arriving at the tepee with my camera I was very coldly received. Upon inquiry as to the unusual manner of receiving me, I was informed by the squaw mother that I had taken a picture of her little daughter some time before and that she had since died, and that my picture machine was "Bad Medicine" and I could use it no more in her camp.

Explanations and protestations of friendship were unavailing. She had spoken.

The Indians of the Northwest keep alive the original

STELLA TU-SLAPS, UMATILLA RESERVATION, ORE.

Indian home life and live in true picturesque Indian manner, more nearly than any other tribes remaining to-day. It is yet possible to secure the most perfect interpretation of the aboriginal Indian in his native environment in the far Northwest. The task, however, is accompanied with a great deal of hardship and tedious work, and in some instances actual peril, where the deep superstition against the white man's inventions still prevails.

But the tribes remaining in this great region present the true Indian environment and home life. They use yet the most gaudy blankets, together with buckskin wearing apparel and ornaments elaborately beaded; live in the original tepee hiden away in the deep recesses of the forest on the bank of the stream. They still pursue the migratory habits

FISH HAWK, CHIEF OF THE CAYUSES.

of yore, and many of them spend the summers in the high mountains, enjoying the fishing streams and hunting grounds, and offer many inspiring opportunities to the artist who appreciates the true historical value of Indian photography.

The people of the Northwest owe a great deal to the Indian. Innumerable instances could be cited where the friendship of yet living Indians has saved whole communi-

PORTRAIT. Nat. Aukerman.

ties from slaughter by the treacherous tribes. One of the most remarkable instances of Indian friendship and service on record in the entire history of the great Northwest is the story of Sac-a-ja-we-a (the bird woman), the Shoshone Indian woman, who carried her papoose on her back across the Rocky Mountains and guided the Lewis and Clark expedition to the West. When Lewis and Clark reached the Rocky Mountains the paths became confusing and they were actually undecided as to the true way to the Columbia river.

With unerring precision this frail girl pointed them to the "Big Water" and saved the expedition from annihalation by the treacherous Blackfeet, whose ways and haunts she knew and warned the captains of.

> "Where'er you turned in wonderment
> In that wild Empire, unsurveyed,
> Unerring still, she pointed west
> Unfailing, all your pathways laid;
> She nodded t'ward the setting sun,
> She raised a finger t'ward the sea,
> The closed gates opened one by one
> And shone your path of destiny."

SAC-A-JA-WE-A.

A SIMPLE DEVICE FOR FLATTENING PRINTS.

By C. R. ARNOLD.

AN AUGUST DAY. C. M. Whitney.

SEVERAL different plans have been proposed for flattening or removing the curl from prints not to be mounted, none of which have I found satisfactory; but the following described plan is not only effective but quicker and simpler for mounted work than shaping with a burnisher, and the work shows no subsequent tendency to curl, which cannot be said of work shaped with a cold burnisher. If any one objects to the first expense let him plod on the old way.

Have a carpenter make of light wood (or a tinsmith of galvanized iron) a drum thirty inches in diameter and three feet long. (If made of iron have a one-half inch rod put through the centre for bearings.) Cover it with cotton sheeting, drawing it tight and smooth and sewing the ends together smoothly. Fasten to the ceiling a window-shade roller (having a stiff spring), on which you have placed in place of the shade a piece of cheese-cloth; fasten one end of this cheese-cloth to the drum, so the cloth will wind from the spring roller round the drum. When the prints or mounted work are dry enough to be nearly (not quite) flat, place them face out between the cheese-cloth and the drum and turn the drum as you fill it, winding the prints tightly between the cloth and drum, and let them remain until absolutely dry. Try one, and if it does not afford room enough you will make more. One will hold something over one hundred prints, cabinet size, or twenty ten by twelve.

"BABBIE"

W. and G. Parrish

CARBON PRINTING.

DOES THE OXIDATION OF THE GELATINE IN THE CARBON PROCESS PRODUCE INSOLUBILITY?

By THOMAS MANLY.

HEAD STUDY. H, P. Bailey.

OPINIONS differ so widely upon this subject that I will endeavor to throw some light upon the subject; not, however, with the object of making any dogmatic statement, but, by giving the result of my observations during extensive experiments in connection with ozotype, I hope to assist other experimenters in coming to a definite conclusion.

As an example we will take potassium dichromate (the reactions being somewhat more complicated in the case of normal ammonium chromate and chromic acid).

The action of light upon a mixture of gelatine and potassium dichromate is probably in accordance with the following formula:

$$2(K_2O, CrO_3\,CrO_3) + \text{organic matter} = \underset{\text{Normal potassium chromate}}{2(K_2O\,CrO_3)} + \underset{\text{Chromic oxide}}{Cr_2O_3}$$

$$+ O_3 \text{ (chromatized organic matter).}$$

A further rearrangement of molecules appears to take place, in which the normal potassium chromate reacts upon a portion of the Cr_2O_3 to form a basic chromium chromate $Cr_2O_3CrO_3$. The gelatine of course takes the eliminated oxygen. Now we will see whether it is the eliminated oxygen or the reduced chromic product which causes insolubilization. That extraordinarily careful experimenter, Dr. Eder, in his classical essay "Ueber die Reactionen der Chromsauer" says that the organic matter which is oxidized at the expense of the chromium appears to remain soluble in water. Now if we oxidize gelatine by some other means than by a chromium compound, for example, by potassium permanganate, we do not get insolubility, although the gelatine receives as much oxygen as from a chromic salt. We must therefore look to the reduction product for the insolubilization action.

The case of ozotype will now be extremely useful to us in elucidating the phenomenon. In ozotype we have

> $2(MnSO_4 + K_2CrO_4, CrO_3)$ + organic matter, and light rearranges the molecules thus first, into $2(MnSO_4 + K_2CrO_4) + Cr_2O_3 + O_3$ chromatized organic matter, and then into $2(MnCrO_4 + K_2SO_4) + Cr_2O_3 + O_3$ chromatized organic matter so that the insoluble effective products formed are Mn, CrO_4, Cr_2O_3, and chromatized organic matter.

By chromatized organic matter I mean gelatine, etc., which has been rendered insoluble by a chromium compound.

It may be stated that the chromate of manganese is the most deeply colored of all the chromates, being nearly black when concentrated and is therefore the most useful chromate for a photographic image. (The use of manganese in ozotype is patented in the U. S.)

We will now consider the action of the ozotype acid bath and see if free oxygen plays a part in the insolubilizing action. We will take the latest bath, consisting of a weak solution of hydrochloric acid and ferrous sulphate. As shown above the image is composed of an insoluble metallic chromate. We lay the gelatine film, impregnated with an acid solution of ferrous sulphate, upon the image. Now let us see what takes place. The acid acts upon the insoluble chromate producing chromic acid or a bichromate, and probably a small quantity of chloride of the metal. The metallic chromate is soluble in the chromic acid (chromic amhydride) produced in the reaction and penetrates the gelatine. This alone would not be sufficient to produce any practical effect. Now we shall see the use of a reducing agent which is essential to the production of intense insolubility. Bear in mind that we have, coming through the gelatine, a metallic chromate dissolved in chromic acid. The reducing agent, which is ferrous sulphate, comes into play and reduces the chromic acid into the unsoluble chromic oxide. The metallic chromate is then no longer in a soluble condition, having lost its solvent (chromic acid) and is precipitated in the body of the gelatine, and at the same time the oxidized iron salt most probably becomes a basic chromate of iron, a compound which has a most powerful and immediate tanning action upon colloids and mucilages. It is difficult to see in the above reaction how the gelatine can become oxidized and yet intense and almost immediate insolubility is produced. I think we may take it as conclusive that no direct oxidation of the gelatine can take place in the presence of a comparatively large amount of reducing agent, and yet the tanning action is no doubt quite as strong as when light acts upon a film of bichromated gelatine, especially when we take into consideration that in ozotype the gelatine is in a wet condition when insolubilization takes place.

It has been shown lately by Professor R. Namias that chrome alum in a more or less basic condition is far stronger in its tanning action than the normal salt. It is a matter for remark that those salts which are prone to become basic such as chromium, aluminum and iron have an insolubilizing effect upon gelatine and it is probable that the formation of an insoluble basic salt in the body of the gelatine causes insolubility. The conclusions that we may logically draw are:

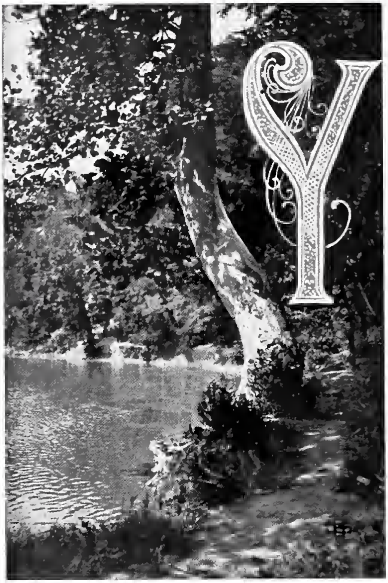
That oxidation alone does not make gelatine insoluble, and that oxidation is not necessary to produce insolubility with chromic salts, and it therefore follows that the reduced chromic compound produces the tanning effect.

SAN FRANCISCO AT SUNSET. Annie W. Brigman.

THE BROOK — Jos. H. Forsyth, Jr.

A PLEA FOR SUNSHINE.

By CHIPPENDALE.



OLD SYCAMORE. Cleo S. Bourgeois.

YOU'LL be a long time dead, so up to that time crowd in all the sunshine and happiness you can. Don't crawl into the shadows and say the sun dosen't shine just because its rays do not penetrate to where you are.

When you and the camera go afield, take some good sunshiny fellow along with you, instead of wandering off by yourself and trying to corral all the good things. It is also a good plan to have a third good fellow along who doesn't "take pictures," as he will help to retain the mental balance of the two enthusiasts when arguments arise.

Some years ago the "Artist" and myself used to make many lengthy excursions in search of things photographic, and on these trips we were accompanied by the "man who didn't." He didn't know a ferrotype from a pound of hypo. Show him a masterpiece and he would say "um," and for just this reason he made an ideal companion on a photographic excursion.

He would cheerfully carry your tripod for miles and just as cheerfully lose the head of it and then tramp back till he found it. If you desired to introduce life into your picture he would pose in any costume or in any position. On one occasion he volunteered to drive up some cattle that we might include them in our proposed landscape.

O. Lippincott.

Unfortunately he proved persona non grata with the leader of the herd, and only saved himself by beating the world's record for a hundred yards, and landing over the fence at our feet in an exhausted heap. As he slowly rose to his feet he remarked: "Cattle — — in — — fine — condition — —, guess — — I've — — got 'em — — where you — — want 'em — now." Nothing could disturb his good nature. If we lost our way, he liked exploring. If we lost our lunch, he was always ready to imagine how much better dinner would taste. If the ants got into the pie, it was "Poor little beggars, they don't get pie every day."

What jolly times we used to have at those al fresco lunches. After the pipes were lit, the stories would commence, and the allotted hour would be gone before we were aware.

All the sunshine doesn't come from above. Get all you can of it, for you'll be a long time dead.

"A NEW ONE.' Theodore M. Brown.

PORTRAIT. Carl Rau.

COLLODIO-BROMIDE FOR LANTERN SLIDES AND TRANSPARENCIES.

By WALTER WM. LAKIN.

A LITTLE GIRL OF LONGAGO.
Mr. Chandler.

MANY amateurs, like the writer of this article, have wished for something better, if not cheaper, than the ordinary commercial lantern plate.

Some few years ago my attention was called to a formula by Sir William Abney for collodio-bromide emulsion, and having a quantity of waste lantern plates on hand it was tried, and I was delighted with the result, so offer my method of working it with the hope that some of my fellow amateurs will experience as much pleasure and profit as I did. First, get a clean, dry bottle of six or eight ounces capacity (the reason we use so large a bottle is to allow room for shaking); pour into it half an ounce of best alcohol (95 per cent.); dissolve 50 grains of nitrate of silver in half a drachm of distilled water in a test tube, or one of those small tubes developing powder comes in, using heat if necessary; when quite dissolved, take into dark room and pour into bottle, when the silver will be thrown down as a white powder; add at once 10 grains of high temperature pyroxyline; let it soak a few minutes, then add to it one ounce of sulphuric ether (s. p. 730); put in cork and shake the bottle, when the cotton ought to dissolve and form the collodion. Now dissolve 40 grains of zinc bromide in half an ounce of alcohol of same strength as above, and add a little at a time to the collodion; give a good shaking after each addition; when all is added, shake for not less than five minutes; wrap up bottle to keep light tight, and put on one side for seven or eight hours to ripen.

In the meantime get ready your glasses; let them be perfectly clean and dry; dip them into the following: Gelatine, 3 grains; water, 1 ounce. Dissolve with heat, and filter through clean muslin; dip in the clean plates while the solution is hot, and put in rack to dry, away from all dust. When dry they are ready for coating with the collodion.

When ready to coat plates give the collodion a good shaking; let it rest for ten minutes; put a little clean cotton wool loosely in neck of funnel; moisten with alcohol, then filter collodion through.

Hold a plate by the thumb and finger at a corner, and pour a small pool of collodion in the center, tip the plate so that it is eovered, after which pour the surplus into another bottle to be filtered and used again.

When collodion is set immerse in *rainwater* a short time till the greasy look leaves the surface, then place in the following for one minute: Ground coffee berries, 1 ounce; water, 8 ounces. Boil. When cold, filter (this can be kept for further use); drain plate, and dry by placing on sheet of glass, over a bowl of hot water.

Now wipe gently with camel's-hair brush, to remove any dust, and place on negative in printing-frame, and expose to gas jet twelve inches from flame for about ten seconds; wash off coffee under faucet, and develop with ferrous oxalate, adding 5 grains of potassium bromide to each ounce of developer; fix in hypo 1 ounce, water 5 ounces.

Having been interested in emulsion making for the past twenty years, gaining an insight in the science of photography, and finding a profitable means of using up my waste glass, with results far surpassing anything on gelatine, I therefore ask you, my readers, to try the above formula, and be likewise happy.

THE HOUSE ON THE HILL. Ralph E. Berger.

THE BOY PHOTOGRAPHER.

By Dr. HUGO ERICHSEN,
Editor of the Photographic Section of the "American Boy."

FOURTH OF JULY. J. R. Peterson.

THE American boy is enthusiastic by nature. If you doubt this, watch him the next time he celebrates the nation's birthday. He is brimful of vitality, and whenever this seeks an outlet in the art-science of photography, the result is truly wonderful and surprising in more ways than one. I recall the story of the boys to whom an indulgent uncle presented a photographic outfit. During his absence the next day, they promptly turned the closet of his bachelor apartments into a dark-room and set the place on fire with an improvised ruby lamp. One enterprising lad in California wrote me not long ago to inquire if I considered a dry goods box large enough for dark-room purposes.

Nothing daunts these intrepid spirits. The more abstruse a photographic problem appears to be, the more it seems to attract them. They revel in moonlight photography, delight in prints on fabrics, and have even been known to attempt telephoto work with more or less success —generally less. When they get thoroughly interested in nature study, no exertion is too great for them to obtain what they want. They will unhesitatingly scale the mountain side and climb the tallest trees to secure a coveted picture.

As a rule, they are hampered by inferior apparatus. Parents, regarding the camera as a mere toy, and photography as a passing fancy of their offspring, are niggardly when it comes to the purchase of an outfit. They are only too apt to regard the expenditure of a five dollar bill for a camera as an unwarranted extravagance, when thrice that amount would not be too much. Generally the boy photographer undergoes a process of evolution that keeps step with his advance in the art-science, adding a new camera or lens with every year or two, continually selling and buying, until he acquires apparatus with which he is capable of doing good work. At this stage he not infrequently graduates into the ranks of the professional. Some of the leaders in artistic photography have traveled this pathway to fame—I will content myself with a reference to Mr. Rudolph Eickemeyer, Jr., although there are others.

Parents, it seems to me, would do well to remember that their boys must have a good camera to do creditable work, and that it is far easier to dispose of an excellent outfit, in case their interest in photography proves transitory, than of inferior apparatus, while the money loss would not be as great.

It will probably surprise most of my readers to learn that the work of the young photographers contributing to the monthly contests of the *American Boy* is of almost uniform excellence. I know it was a surprise to me when I first undertook to select the prize winners and experienced all the sensations of puzzled judges at camera club exhibitions. Of course, some of the photographs are technically bad, but by far the majority are above criticism in this respect. Nor do they lack originality. Boys are great "snapshotists," as the English say, and nothing within the range of their camera is safe.

THE OLD WAY. J. A. Anderson.

CHILD STUDY. W. von Gloeden.

TILTING THE CAMERA.

By JOHN BARTLETT.

A SNOWY ROAD IN OUTSKIRTS OF PARIS, FRANCE. W. O. Emerson.

THE inclination given to the camera in making a portrait makes a material difference in the appearance of the head. If we take a marble bust picture, for instance, from the same point of view, but vary the angle of inclination upward and downward and examine our results in the print, we shall be surprised at the difference. Where the camera is on a level with the head, the eyes seem to look straight forward. Where the camera is tilted upward, the head is thrown backward and the eyes appear turned upward. Where the camera is downward inclined, the head appears bent forward and the forehead is broader; in fact the face looks more pointed toward the chin. These changes in the position of the camera, by altering the lines of the head may entirely alter the expression of the face.

According as the face (in the bust) is made to look up or down, a scornful or sad impression is produced. Of course, in the living sitter, expression is in a great measure dependent upon the individual temperament, but even here the manipulation of the camera may be of valuable service.

Portrait cameras as well as landscape cameras are now provided with a swing-back, and the photographer may call upon the agency to rectify distortion ; but the swing-back demands much more caution in its use in portraiture than in landscape, and it may even be called into service to produce certain artistic (or artful) effects.

We are generally accustomed to see our fellow-mortals on a dead level with ourselves, and the average portrait looks most natural when so taken, but occasion may demand an elevation of the subject.

My attention was reeently directed to the importance of judicious use of inclination whilst observing a photographer of considerable reputation engaged in photographing a statue in one of our museums of art. The statue, at least the head of it, was considerably above the level of ordinary vision, and as the operator was unable to get at a suitable distance from the subject, I naturally expected to see him do as nine tenths of operators are accustomed to do under like circumstances, that is, employ his swing-back ; but he did not do so, much to the surprise of his erudite assistant, who proffered advice to that effect. He allowed his camera to assume a slight upward inclination. On inquiring his reason for deviating from the time-honored procedure, he informed us (the assistant as well as myself) that a statue of heroic cast and dignity of expression, exhibiting a triumphant scorn, so to say, demands an intensity of effect, and not a diminishing.

Experience had taught him that, by raising his camera on a tall tripod or platform so as to get a level aspect, he lost not only the dignity of the original, but gave a strange and distorted image of it.

Such statues are intended to be looked up at, and the sculptors chisel the features accordingly.

Our famous Wm. Penn statue on the public buildings, or Bartholdi's great monument of Liberty Enlightening the World in New York harbor, when seen on a dead level look odd enough, because they never were intended to be looked at placed down on the ground.

We can remember how distorted-looking and even unreal were the beautiful bronze horses (the winged Pegasus) which were exhibited at the Philadelphia Centennial in 1876. While they were placed on low pedestals shortly atter their arrival on the ground, their glyptic qualities were not brought out until they were placed at a proper artistic elevation. We had to look up at them, and then the beautiful proportions of the anatomy and grandeur of the sculptor's idea began to dawn on us.

We see the distorted proportions in many a photograph of ancient sculpture produced by too conscientious use of swing-back.

There are statues and groups, however, which demand an opposite method of treatment, a downward inclination of the camera. Nereids and Tritons and water nymphs, which are supposed to live at sea level, or about fountains, where one must look down.

In architecture, too, a slavish observance of use of swing-back produces unnatural or exaggerated effects.

In landscape it may be advantageous to tilt up or down at times to get dignity or beauty of scene. Particularly is this the case in photographing an avenue of trees, so as to give the effect presented to normal vision.

Often, to get a better view of an architectural subject, we take the trouble to climb up an elevation, or bother the people opposite to let us get on their roof. True, when we overlook an extended prospect, the effect is often improved thereby; but when large or imposing subjects are photographed there is danger of depressing, and the beauty of effect in the subject is nullified.

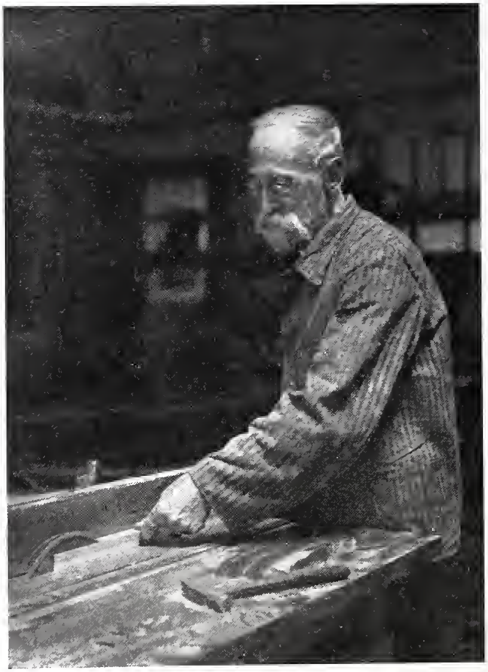
The distance at which a head is taken often materially changes the character by narrowing or broadening the face, especially when a full-face view is taken. People sometimes say, "that picture doesn't look like me," and they are often in the right, and ought to get credit for having good perception, instead of being emphatically reminded that the camera "can't lie." Why, the camera can prevaricate, and, like Macbeth's witches, "lie like truth."

Where the camera is placed close up, the face is narrowed; where the camera is removed further off, the face is broadened, because we see so much more of the cheeks. The same face may thus really be given either a robust or a delicate, ethereal appearance. Where the camera is closer the chest is narrowed as well as the face made thinner. So you see it is important not only as regards size of figure, but also as to character of subject, to determine the distance from which the figure is best presented.

A stout figure may thus be modified in proportions and the result made more pleasing to your patron; or a thin person may be made somewhat *en embonpoint* to his or her advantage pictorially.

In making enlargements from small-size negatives, you may notice an amount of distortion, or rather exaggeration, which was not perceptible in the miniature; hence the importance of taking proper distance when making negatives intended for enlarged work.

We have often heard the remark from the patron that it made her look too slender, and right she is, for really the small negative had been taken too close up. But the patron does not see into it, and it is vain to explain that a long focus lens should have been used by her obliging friend, the amateur



AT THE SAW BENCH. J. R. Peterson.

HERO. Count von Gloeden

SNAP SHOTS ABROAD; SNAP FIRST—REFLECT AFTERWARDS.

By CHARLES M. CARTER.

W. von Gloeden.

UNDOUBTEDLY the best manner of preserving souvenirs of one's travels is by means of photography. Written descriptions are all very well in their way, but photography presents the form itself, and its varying appearance under different effects of light. Now that the use of the camera is so easy, no intelligent person should think of traveling without one.

What apparatus to use depends on circumstances and the predilections of the person using it; but for the average traveler, who does not wish to be overburdened, some one of the folding pocket cameras will be found the most universally satisfactory. While they may be placed in the pocket, experience shows that they are most satisfactorily carried by a strap over the shoulder. There it is always ready, and need not inconvenience the traveler the slightest.

With cameras in enclosed boxes the conditions are different; their form does not permit them being carried easily over the shoulder, and to carry one in the hand is an undoubted nuisance. In European travel, in particular, one is very apt to start on their sightseeing early in the morning, and, perhaps, not return to the hotel until evening. Meanwhile one is inspecting historic buildings, museums, art galleries, etc., and much of the time standing with guide-book in hand—all of which is wearisome to the flesh. Under such circumstances a camera that keeps itself in evidence adds much to that "tired feeling," and is to be avoided.

But a pocket-folding camera no longer means a minute picture. Now we may obtain marvels of ingenuity in the 4-inch x 5-inch size. This gives a respectable sized print, is not too expensive, and is suitable for making lantern slides by contact or enlargement. As for lenses, the chief difference between the ordinary and high grade is the difference in power of illumination, the expensive lens making it possible to get pictures in poor light that would not be otherwise obtainable. The fixed focus has its advantage in rapid work, and, in a general way, it should be stated that the less number of movements required to make a shot, so much the better. For instance, around the corner you hear approaching music, and, almost before you know it, you are in the presence of a rapidly moving procession of interesting natives. Of course you must have a shot at that—then you will see the advantage of few movements.

Before starting on a journey one should become thoroughly acquainted with one's camera as to ordinary use. In addition, learn to hold it so as to make short shots without using the finder. To be able to hold the camera high above one's head and make at will a shot is valuable in a crowd. The writer remembers making some shots this way, during the celebration of the 14th of July, in Paris, that would have been out of the question with the camera against the body. As far as possible use the air-bulb—there is less likelihood of movement during exposure.

We now come to the most important consideration—the state of one's mind! Briefly stated, I should stand for the advice contained in the heading of this article: "Snap first —reflect afterwards." Whenever you feel the slightest interest in a subject, or when you commence to debate as to whether you had best "waste the film" or not—make the shot, "reflect afterwards." The importance of this advice will be understood when one reflects that, if traveling rapidly, there is very little, if any, "going back." Instant decisions are necessary. The value of the films you may waste by such procedure is no comparison to the disappointment you experience afterwards thinking of what "might have been."

If you do stay in a place long enough to view the subjects several times, there is the danger of their familiarity disarming you for the time being; but when you are home again, you will realize that these subjects now interest you; that they were different from your home surroundings, and you will wish very much that you had photographed them when you had the opportunity. Hence it is that I advise strongly, photograph all subjects the first time they appeal to you.

Personally, I thought I had fully learned the value of the above advice, but, on my last trip to Europe, I missed several subjects because I did not follow what should be the invariable rule

Snap first—reflect afterwards!

STREET SCENE, PARIS. Myers R. Jones.

O. Lippincott.

JONQUILS Belle Johnson.

DEVELOPER POISONING.

By JAMES SHEPARD.

ON A YORKSHIRE RIVER. Lionel Dickinson.

WHILE no developer may be poison to some persons, some developers are poison to many persons, and all developers are poison to other persons. To quit photographing appears to be the only sure remedy, although such medicine may be very disagreeable to the taste of an enthusiastic artist. Perhaps others may find pleasanter medicine than that above prescribed, but in any event a doctor can do nothing without knowing the facts and hence I am led to give the experience of one sufferer whom I will call Jones. He photographed and developed for five or six years, using pyro, amidol, eikonogen, and perhaps other developers without any poisoning whatever. He then used an intensifying solution containing *potassium cyanide* which, coming in contact with his fingers, made them sore. Of course, the remedy for this would be to keep the fingers out of it. The fingers however got well and never again went into a solution containing *potassium cyanide*, but for years after that, whatever developer he used poisoned his fingers which had never before been injured by any developer. Besides getting the cyanide into his system he was, and for many years had been, full of sumac poison, both kinds, the vine called the poison ivy and the tree variously called the poison sumac, poison elder and poison dogwood. He would oftentimes have a recurrence of this sumac poison without any fresh exposure.

Finding developers poison to the fingers by contact, Jones resorted to wearing rubber gloves which he removed after developing and then found that taking the plates from the hypo fixing bath poisoned his fingers. After much painstaking, and keeping his fingers out of contact with both developers and fixing baths for about two years, the fingers did not poison by a moderate contact with developers but did poison again after repeated contacts, so that abstinence or gloves were again the only plan of safety. To get poison out of the system he took *potassium iodide* until the poison came out on his hands and face and his eyes were swollen and closed, in every way appearing just exactly the same as if he had been exposed to a fresh attack of the poison sumac tree. But instead of running its usual course and getting well, it turned into eczema with which he suffered much for several months. At length he thought he had so far recovered as to do a little developing once more and prepared an amidol developer and a fixing bath, gently handling the dry hypo and sulphite of soda when weighing them out. The next day he found his hands in a state of eruption so that developing was out of the question. When this poison was quiet, he first thought he would put on gloves and try again, but having an assistant handy he concluded to merely direct the matter while the assistant handled all the material. The developer used was amidol. The next morning his eyelids were slightly swollen but he did not at first connect said fact with the developing. Another trial resulted the same. In these two cases the developing was of short duration. On a third time it was continued longer and with much worse results. It then occurred to him how this swelling had invariably come on the next morning after the developing in which all the handling of the material was done by an assistant, and the only possible theory of developer poisoning was that it was due solely to the fumes of the developer or fixing bath without any contact whatever with the chemicals other than the fumes. In fact he was so sensitive to chemicals that he poisoned his hand by carrying home a package of carbonate of soda well wrapped up in paper. Later he was poisoned by being for some little time in a room adjoining the dark room where all the developing was done, and without even stepping into the developing room.

I have called this poisoning because it was poison to

Jones, but I presume it was not a proper poison and that the trouble lay largely in his poisoned system. But whatever it may be, it is such a serious matter that after nineteen years of photographing the only safe way for Jones to continue the same is to merely press the button while some one does the rest.

Knaffl & Bro

SHOWERY WEATHER. Thomas A. Morgan.

SKIES.

By J. A. ANDERSON.

OF cloudless blue lose their charm when translated into the plain white or gray of the photograph, in which at least a suggestion of clouds is needed to complete the landscape.

Clouds may often be successfully photographed with the landscape when both are lighted so nearly alike as to admit of approximately the same quick exposure, but usually the sky is so much more brilliantly lighted that clouds are much over-exposed in the time required for the rest of the view. They may sometimes be saved by careful development or subsequent reduction, but the results of these processes in unskilled hands are uncertain.

It will often happen, too, that suitable clouds are not present, in which case separate sky negatives must be provided from which clouds may be printed in.

Films are the best for these, as they can be printed either side up, giving the light from either left or right. The direction of the light should be noted on each negative.

Both vertical and horizontal sky negatives will be needed, and some lighted from the front and some from the back.

It is well to use the same focal length of lens for both sky and landscape, but clouds vary so much in size and perspective that a 4 x 5 view may often take a suitable sky from a 5 x 7 negative.

There should be a variety Brilliant, cumulus clouds make fine pictures and are perhaps the most generally useful, but the stratified and the fleecy are not to be neglected.

Odd and curious skies and the so-called "moonlight" views are interesting, but of little use for printing in landscapes. Avoid large patches of light or dark, and as a general rule it is not well to have the sky too prominent. In paintings skies are usually quite subdued, unless intended to be a special feature, as in a storm or sunset.

Beautiful cloud masses are often seen near the horizon, with much clear sky above them. These are not as useful as when the sky is fairly well covered, as the space to be filled on a picture is often considerable, and is sometimes but a corner at the top.

J. A. Anderson.

Some land or tree tops should appear, to show readily which is the bottom.

There should be enough sky negatives to avoid too frequent repetition of the same forms in successive pictures. Much variety can be had, however, from a single negative, by different depths of printing and masks of different densities.

Skies are often slow to pose and quick to move, so that while sky photography presents quite as interesting a study as that of more tangible objects, it requires patience in seeking fine effects. Orthochromatic plates are best, and usually a yellow screen is necessary.

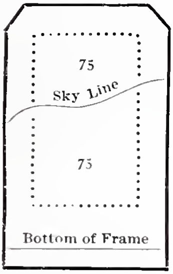
The writer has used chiefly Carbutt's cut films, Ortho. 23. A satisfactory general rule with these and a light yellow screen and aperture *f*22, is one second exposure in bright summer mid-day light. Variations in light can be estimated, or determined by a meter, and when clouds are moving rapidly a larger aperture and shorter exposure will be needed. Proportionate differences must, of course, be made for plates of greater or less rapidity.

To prepare the masks needed in printing, trace roughly the sky line on translucent paper laid on the film side of the negative. Cut it in two at this line, and, keeping the same side up, mark, from one of the pieces, the sky line on

a card or thick paper of the size of the printing frame, with a little extra at the bottom to hold it by. So place this line that it shall come opposite the sky line of the negative when it is in the frame. Mark on the same side of the paper, above and below the sky line, the number or other designation of the landscape negative to which it belongs, and a line representing the bottom of the frame. Cut off the two upper corners and cut it in two at the sky line. *See figure.* If the method described has been followed, the side on which the numbers have been marked will come next the frame in printing. When the masks are not in use, put them away in numerical order for future printings.

PORTRAIT. J. E. Greene.

First print in the clouds. With sky negative and paper in place, hold the frame in the light with the left hand and the lower mask with the right, with the finger tip at the line marked "bottom of frame," as a guide in moving the mask. With the latter just covering the part where the landscape is to come, "jiggle" it up and down while printing so as not to make a defined line, counting seconds which, with the writer's negatives and platinum paper, in strong sunlight are from five to fifteen, depending, of course, on the effect to be produced. Except with printing-out paper, the effect cannot be learned by inspection, and the time must be found by trial and experience.



Outline of frame in heavy lines Outline of negative in dotted lines

In putting negatives and paper in the frame it is well to observe a fixed rule, say top to the left, at the same time writing on the paper the serial number of the negative, or something else, to show which is top, thus obviating the danger of getting the paper turned in transfer and finding clouds and landscape on the same part, with paper not showing the clouds before development.

Transfer the paper to the landscape negative. If its sky is defective or too thin for the tone desired, the upper mask must be used. Lay this on the frame with its sky line corresponding with that of the negative, and hold it there by rubber bands at the ends. It is to prevent these from drawing it away from the side that the corners are cut off. Put a piece of tissue paper over the frame and under the bands. If the mask is a quarter of an inch from the negative, the diffusion will be sufficient. As an additional precaution, place the frame so that the direction of the light is a little slanting toward the sky of the negative. If this sky is dense enough and without defects, the sky mask and tissue may be discarded. A thin negative will give a gray sky, and a similar effect is produced in long printing with a sky mask through which the light may act. Even quite heavy Manila paper allows of some such action.

When there are open tree tops through which the sky appears they are left out in tracing the sky line, and the sky mask can seldom be used in such cases, as the tone around the tops would differ from that seen through them.

In printing clouds above a sea line or other delicate subject, great care is necessary to avoid getting parts of them below the sky line. In cases requiring extreme accuracy the position of the paper should be fixed by marks on it and the frame.

If a landscape is to be printed under a mask of special shape so as to show a white margin, and clouds are to be printed in, the paper must be attached to this mask during both printings. White adhesive paper is useful for this.

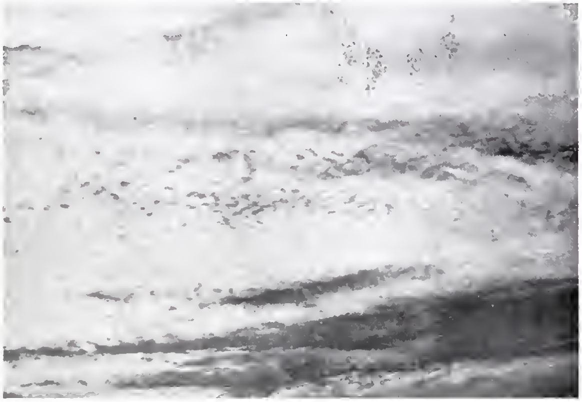
Clouds should not show on a sail or steeple. If these cannot be masked so as to prevent this, select clouds that do not come on the object, or print so lightly that they do not show where not wanted.

As a rule skies are to be printed in a landscape much lighter than as separate sky pictures. A heavy sky may appear so brought forward as to destroy the perspective effect, or draw the attention from the principal object in the picture.

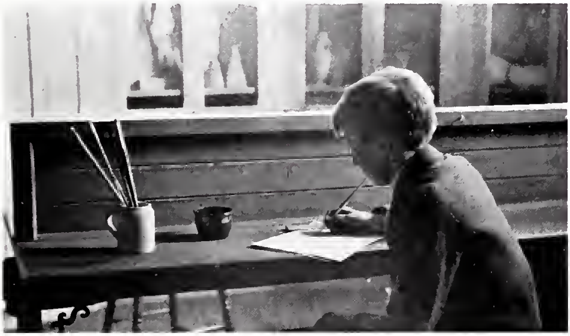
It is well to note on the landscape negative the number of the sky negative selected for it, and the time of printing found best for any particular effect.

Skies by themselves are beautiful printed in blue with white margin. These fastened together in book form make an interesting collection, which serves for reference in selecting skies. On the back of each note the serial number of the negative, the direction of the light, and whether film or glass.

The study of skies with the camera, whether for their inherent beauty or for use in landscapes, is one that be-



comes increasingly fascinating, with the advantage that the pictures are infinite in variety, and that, instead of the operator having to run about after them, they come to him, and the amateur should not be satisfied with his landscapes until he has supplied them with suitable skies.



AN AMATEUR. M. Chandler.

MOTHER AND CHILDREN. Gertrude Käsebier.

ON PHOTOGRAPHING THE INVISIBLE.

By H. H. WILLIAMS.

FIFTY YARDS TO THE NEXT POST.
Eugene Grygla.

SEEING the very interesting article in the June number of the BULLETIN, of "Photographing the Invisible," it struck me that is what many of us have been doing for many years. Sometimes we know we were doing it, often not.

For instance: One day a friend (who contributed many useful articles to these pages) called for me and we went "snapshoting" at the Liverpool Docks. Finding a man painting a ship's stern I carefully centered him on the finder, "touched the button" and heard the shutter run. When I came to develop the plate I found not the man and the ship, but the building back of me across the roadway! I could never discover *any* reason for this singular state of affairs; it *must* have been an X-ray picture through my body, the back of the camera and three or four other plates!

There is another class of "invisible" (?) pictures that we *can* account for, though the makers of them often seem puzzled. I allude to the very fine reproductions of fingers and thumbs that one often sees on development prints, yes, and on collodion prints as well. A moist finger will mark almost any paper even if the hands seem quite clean. Now I know many do not even rinse their hands after transferring a print from one solution to another, and they are much surprised to find ugly marks on their finished pictures. In toning silver prints red marks can often be taken out by putting a little bicarbonate (cooking) soda on the place as soon as it shows. Very often the spot looks greasy and repels the solution; the soda destroys the grease and the toning proceeds. I also find this useful in collodion-matte papers.

I wish I could impress on all who read this article the advantage of absolutely clean dishes and hands in all photographic work. Half the failures arise from "matter displaced"—in plain English, DIRT. How many amateurs dust off their plates ere they put them in the holders? And yet they "wonder where those pin-holes come from." Do you ever put your dishes and graduates away dirty? Dried-on dirt sticks fast.

There is another way of making inadvertent pictures that often causes much perplexity, and that is, minute holes in roller blind shutters and bellows.

Rubber cloth is largely used for the bellows and blinds; in time it gives way and minute holes appear. It is well, now and then, to examine both shutter and bellows in a very strong light, very carefully indeed. A camera with *good* leather bellows is much cheaper in the long run. Look particularly at the corners, and extend the bellows fully, as often the fault only appears when a long focus lens is used. If you suspect the bellows or woodwork, cover one-half of a plate with some opaque material, put it inside the camera in the dark room, insert a plate holder, cap the lens, and place the camera in a bright light for half an hour. Develop the plate for, say, five minutes; if one-half is fogged, you know there is a leak somewhere. Careful examination of the camera in sunlight or near a powerful lamp at night will show the leak.

There is yet one more "invisible" (at least to most eyes) that applies to professionals, and that is not looking for the characteristics of their sitters when they get them under the skylight.

One pose and one way of lighting will not suit everybody, and yet look over almost any photographer's show-case and you will see how very much alike they all are.

These characteristics of manner, expression, etc., are really invisible to very many operators, but can be seen by use of our old friend, "Bromide of Brains." "Rule of Thumb" will not work here. It may enable you to make a clean, sharp negative, the other alone will enable you to make a really artistic picture.

MARY AND THE LAMB. Baker Art Gallery.

THE BEACH, BOURNEMOUTH, ENGLAND. H. P. Bailey

ADAGIO SOSTENUTO. Walter Zimmerman.

BROMIDE ENLARGING.

By HENRY ERLE COOPER.

W. Von Gloeden.

PROBABLY one of the most neglected branches of professional photography to-day is bromide enlarging. This is strange, as it is undoubtedly one of the best paying lines that a photographer can devote his attention to. The technical skill required is easily obtained with a little practice, and the spare time, of which the majority of photographers have a share, can be devoted to it.

Compared with taking direct a large negative, the plan of enlarging has many points to recommend it, perhaps the strongest being that a photographer can take more small plates, with shorter exposures, and get a larger percentage of success at a quarter of the cost for plates, than he can when the larger sizes are worked direct, and this does not take into consideration the question of the trouble of handling a large and unwieldly camera when quickness is important.

I presume that every photographer, as he goes through his negatives at intervals, prides himself on a certain number that are of especial excellence or interest, his most successful portrait studies, negatives of interesting local events, of well-known local folk, of historical buildings and picturesque scenery of the neighborhood—these are the negatives that it pays to enlarge, and to leave them on the shelf is to neglect a source of income that is only waiting to be tapped. One good plan is to do a series of small negatives of the most picturesque spots in the district, taking great care to secure the most artistic effect possible. A dozen of the best should be selected and enlarged to 20″ x 16″, and published as a series one by one, with a carefully selected title to each, printed with the photographer's name and address on the mount. At a reasonable price they should sell well. A new one should be displayed every week in a prominent position, and then, if possible, the whole of them together if space permits. If the photographer has no window show available, the local bookseller should be approached to exhibit and sell them. If well done, it should be the talk of the town, and the best advertisement ever issued from the studio whose name they bear. Regarding the method of work, any text-book on bromide enlarging will give the necessary instruction, but the following hints from personal experience may be of additional value: To the professional who works by day, and to whom speed is important, daylight, as an illuminant, is much to be preferred, as it avoids the use of expensive condensers and illuminating power—is much more even, and the exposures more rapid. A north skylight should be selected, and if a reflector is necessary, it should be fixed at an angle of forty-five degrees, and out of the direct rays of the sun. The most suitable lens for enlarging is one with a flat field that will well cover the original negative. Often the lens that was used to take the negative will be found most suitable. A special cap should be provided having dark-yellow glass in the end, so that after focussing it may be placed on, and the image centered properly on the sensitive paper.

To obtain the proper exposure easily, and to avoid waste, a sheet should be cut into strips of one inch wide, and one or two used as a trial in determining the proper time; when this is obtained, a dozen prints can be done in the time that the man with the large direct negative would take to do one print on a print-out paper. An important factor, in obtaining a pure gray tint, is the developer and exposure, to avoid greenness, which with many is a difficulty. Over-exposure, and the too liberal use of bromide, should be avoided. Of the many developers recommended hydroquinone and metol, or amidol, will produce the most satisfactory results, only sufficient potassium bromide being used as will avoid brownness or greenness in the shadows. An acid fixing-bath is strongly recommend, both for its keeping qualities and to insure pure whites.

As far as possible it is advisable to keep to two or three standard sizes of paper, although occasionally it is well for variety's sake to try unusual shapes when they suit the subject—such as long panels, circles or ovals. If only a few sizes are used it will simplify matters and avoid numerous waste. 15″ x 12″ and 20″ x 16″ are two convenient sizes. Mounts, either cut out or pasted down, should be stocked; also a few high class, but showy frames, for the same sizes, kept ready; and then, whenever a suitable negative is secured, it should be a simple matter to place it in the enlarging camera, and at a very small cost do, say, a 20″x16″ enlargement. If a good negative, it should require but little working up, and in twenty-four hours should be in the frame temptingly displayed before the customer. If no sale is effected, it should make an excellent specimen for window display, and, in any case, the loss is small. One difficulty, that is more imaginary than real, is the working up of bromides. All enlargements are improved by a little working up or finishing; but to the photographer who can retou.h a negative, or spot a print, this should be no difficulty.

The best finish is obtained by the use of watercolors, with the shadows brightened with gum water. If this method of work is found too difficult without practice, the next best method is to use crayons and chalk, using them in pencils and powder; clouded backgrounds and vignettes should be inserted with stumps and chalk powder, whilst fine detail and sharpness can be secured with the crayons. By these means any photographer should be able to finish off his own enlargement, and have under his command a branch that will yield constant employment to his assistants, and, what is more important, help to swell the returns for the year at a comparatively small outlay or risk to himself.

ILLUSTRATION FOR "EBEN HOLDEN." Clarence H. White.

THE HIGHWAY OF COMMERCE.

By A. W. COOPER.

G. Edwin Keller.

THERE is perhaps, in these latter days of ultra pictorialism, a tendency for aspirants to photographic pictorial success to be somewhat at a loss where to turn, and what particular subject to choose for specialization in order to avoid the sneering gibe of the ignorant critic with his glibly uttered and triumphant cry of "plagiarism," and so to those of susceptible tendencies perhaps the following suggestion for a line of work may prove useful.

Our railways, prosaic and commonplace as they usually appear, sometimes assume a lovelier guise than ordinary when under the softening and mellowing influences of adverse atmospheric conditions; and though at such times they may seem unadvantageous for purposes of locomotion and transit, yet, to the photographer of pictorial tastes the mystery and gloom of heavy mist or rain may supply the one thing needful to convert the commonplace into the artistic.

It may appear strange that when the weather is at its worst then is the best time for the photographer; but so it is, for at these times the steam and smoke hang round in festooned wreaths, and give ample time for selecting the moment for exposure, so that clamoring detail and formal outline may be softened down by the enshrouding steam.

In choice of subject the tyro should be very careful, and a very brief experience will show that the best results are to be obtained when the atmosphere is damp, or even wet and cold. At such times steam will often be seen issuing from the front of the engine, especially when just

THE DARK SIDE.

starting, and if the wind is blowing from the engine to the camera very striking effects may at times be secured.

Undoubtedly the best form of camera for this line of

TO THE NORTH.

work is one for use in the hand, as the point of view sometimes requires to be changed immediately preceding the exposure, or the only available position may not permit of a tripod being used. There is also another point in favor of the hand camera. When some of the large expresses thunder past the tremor of the ground would pass through the tripod legs to the camera, spelling disaster to the resulting photograph; but this tremor or vibration does not seem to be conveyed through the operator's body in anything like a corresponding degree.

The camera should be fitted with a good R. R. lens, which will work at a large aperture, as it often happens that a signal box or a station house is included in the angle

FULL SPEED AHEAD.

of view. A shutter capable of giving different speeds of exposure should also be fitted, and a rapid and efficient plate-changing apparatus. The finder should be as large as possible and include no more than will be obtained on the plate (one of the exact size of the plate is preferable), and the camera will be of double service if provision is made for focusing.

Moderately fast plates, rich in silver, should be used, and in order to secure the delicate modeling in the steam they should be well backed.

The exposure must necessarily be short, for apart from the facts of the camera being held in the hands and the objects of the pictures moving, the working of the engine causes it to vibrate very much, and in the time for a typical snapshot would show enough movement as to cause a blur. As to whether the locomotive should be rendered quite sharply or no is a matter of personal opinion, and quite successful pictures are on record where a slight diffusion has helped the effect.

Development should be carried out with a dilute developer, and one that is weak in density-giving agents; a thin, well graded negative being worked for rather than one with great contrasts, for contrast can always be secured when needed by the employment of suitable slow printing processes. If the negative in the first instance is blocked up in the highlights, the chief charm of this class of subject is gone.

The chief requisites for success in such a field for work seem to be plenty of steam on the part of the engine, a light wind, and on the part of the photographer good apparatus, quick judgment and plenty of plates.

The utilization of the common objects to be found on any railway will yield a grand variety, and those who have ready access to the highway of commerce will readily recognize the enormous possibilities this particular branch of work will present.

THE BREAKDOWN GANG.

O. C. Conkling.

THE DIRECTION OF PHOTOGRAPHIC PROGRESS.

By CHARLES E. FAIRMAN.

JUDY. Robt. E. Weeks.

IN the annual publications devoted to photographic subjects we are inclined to look backward and to look forward to attempt to determine what has been gained in the past, and if possible to predict what the photographic future has in store.

From the point of view of the amateur it appears that the gain in photography has been to the greater extent in the perfection of processes and mechanical appliances, and that with this we are too apt to feel a spirit of contentment and to moralize upon the great photographic advances accomplished.

If photography is a science we have reason to be proud of the rate of progress ; if an art, we have reasons abundant for feeling that the future is all before us, and that the trail has not yet been blazed to that point where we ought to be satisfied.

Too much content is derived from the consideration of the achievements of a single year or perhaps a dozen years. We seldom look farther into the past. And yet how much better is the work of the majority of the photographers of the present time who take up portrait work as a specialty than the work of some of the pioneers who were at work twenty-five years ago.

Compare if you will some of the old daguerreotypes, some of the old ambrotypes, and some of the old albumen prints made from wet plate negatives, and then decide how much has been achieved in the last twenty-five years, and you will probably determine that the masses are making about the same class of work that was made as long ago as the seventies by the pioneers. Has the quality of the work kept pace with the improvements which have been made in all the lines of mechanical facilities? Do improvements improve, or is this condition due to the men behind the cameras? Have they lost their grip; or have they been misled by the plates which they are using, by the lenses of superior make, and the great change in methods?

In the line of landscape work where is the improvement over the work of such men as Jackson, who lived close to nature and interpreted her varying moods by the primitive methods of wet-plate days; when the tent darkroom accompanied the photographer in all of his wanderings among the then unphotographed wildness of the Rockies, the Canon of the Colorado, the Yosemite and the Yellowstone? Compare the work of that day, that of the old fellows as we are pleased to call them with the work of the men of to-day, and you will find that from the work of the pioneers there is much to learn and much to admire, and that we of the present day accomplish our work with greater ease, but not with greater skill or art feeling.

The reason for this lack of advancement may be contained in the fact that the ideal of the photographer of to-day is placed upon the possession of improved facilities, and not upon the ideal of a better and a more artistic class of work. If the ideal is in the direction of improved apparatus when these are within our grasp the future contains nothing of promise. If on the contrary our ideal is to do a better class of work, if true to our ideal, we will find some means of accomplishing the end; but nothing can be more disastrous than to feel contented over what has been done in the past. The awakening will come and it will be rude.

The true line of progress in photographic things should be in an art direction. It is true that much interest has been developed in this line, but the interest has not as yet become universal, and what is needed is a universal movement that shall completely level all distinctions of minor importance such as the kind of lens, the kind of plate, the kind of paper and the particular methods employed. The development of individual ideas in working out photographic art problems should be encouraged, and work should be attempted which shall bear the strong impress of the individuality of the man behind the camera, not the impress of the lens upon the individual. In the improvements which have followed the development of photography all should gladly avail themselves with a feeling that with the removal of difficulties there is greater opportunity for a better class of art work, work which shall lift the profession out of the common field and suggest different paths by which artistic success may be gained than by resting on the traditions of the past, and weakly copying methods of which photographers of thirty years ago were the masters.

TEARS. O. C. Conkling.

A CANCALE GRANDMOTHER. Walter Zimmerman.

RAMBLING NOTES FOR A TOURING ARCHITECT.

By HENRY C. DELERY.

THE LYCHE GATE. Lionel Dickinson.

THE old saying, "There is nothing new under the sun," perhaps finds no better application than in the profession of architecture, for, if we examine real works of art in architecture we can trace their origin to the misty and legendary past, and the trained and intelligent architect of to-day, when preparing a design of importance, obtains great assistance from the works of the old masters, and even from his contemporaries. His library is replete with works of this character from which he may borrow suggestions in a general way; but there are specific instances where personal investigation is required, and the architect finds invaluable assistance in the employment of his camera to make permanent and lasting impressions of his researches. And the student too can, in his rambles, secure faithful reproductions of his observations which can be stored away for future reference.

But here, unfortunately, these records or photographs are done in a superficial way, no attempts being made to obtain artistic results, though there are none more educated to the requirements of an architectural picture than the architect or his draughtsman. It is true that when traveling one does not wish to be hampered with bulky apparatus, and recourse is generally had to the compact film camera, which though very efficient for general landscape work, is hardly suitable to the severe requirements of an architectural photograph. A substantial compact plate camera, where the picture can be focussed and judged on the ground glass, so that the lines of perspective are correctly rendered, is infinitely more suited to the touring architect or draughtsman.

The camera should necessarily be compact, yet at the same time possess those requirements which are so essential to the making of a perfect architectural picture. Five by seven is perhaps the most convenient size, one which is a happy medium between the conventional commercial photograph and the amateur snap shot; four by five is also very good, but hardly large enough to secure details. The camera proper should be fitted as nearly as possible with all the working parts of the standard tripod camera, such as rising and falling front, rack and pinion movement and swing-back. This latter is one of the greatest drawbacks of the hand camera for architectural work, the swing usually provided being so small as to preclude the possibility of completely rectifying the converging of the lines of a tall building; and in selecting an instrument one should take particular care to choose an instrument in which the swing is very pronounced.

The lens must be absolutely rectilinear, attributed with great flatness of field, be able to cover the plate sharp to the edges with full opening and sufficiently rapid to work instantaneously on dark colored buildings in dim light, and the shutter of the Bausch & Lomb variety, which can be set without opening the lens. A folding tripod with telescoping parts to set up the camera for interiors and time exposures completes the outfit.

The first requirement of an architectural photograph is good and correct perspective; it is here the base on which rests the whole picture, and if bad, no after manipulations will make it good. Too much stress cannot be laid on this point, and no one but the architect and draughtsman understand this fact better, and their skilled eyes and trained judgment will not fail to guide them in selecting a point of sight. Here three things must be considered: the distance from the object, the height of the horizon, and the location of the view point with the sides of the building. All these propositions are in a large measure governed by the building and its surroundings. As we are using only one lens, the first point will be greatly influenced by the angle thereof, and in relation to the size of the picture desired in the photograph. A position taken too close to a building gives harsh and violent lines in the perspective. The position should be taken at about four times the height of the building so as to ease the horizon line and give more scope in obtaining perpendicular lines with a camera having a restricted swing-back. The location of the view point in regard to the sides of the building is very often determined by the building itself. A point must be chosen which will give prominence to the front or principal facade, keeping the sides subordinate, yet being careful not to have the corner or dividing line of the building in the centre, making both sides of equal length, and giving a monotonous and uninteresting effect. The position of the horizon is primarily governed by the height of the building; for a two or three story edifice a station from the ground is correct, but for a "sky-scraper" a point should be taken at about one-third the height of the building.

Secondary to perspective, the lighting of an architectural subject is of great importance. A draughtsman usually casts his shadows on his drawings at an angle of forty degrees, and obtains pleasing results. This is a very good plan to follow, and it would repay the tourist, if before exposing his plate he made a preliminary excursion to ascertain the best time of day when the position of the sun will be most satisfactory. A shadow should hardly ever exceed a depth of forty-five degrees from a projection; long, deep shadows caused by the sun when too near the zenith, are always unsatisfactory in a photograph. Of course, it is needless to mention that the principal side of the edifice should be the one most brilliantly lighted to give it prominence, leaving the other portion in the shade so as to break the monotony and give relief to the picture.

Regarding the exposure, it is always best to make it as liberal as possible, and use the smallest stop circumstances will permit, the great desideratum of an architectural photograph being sharpness and detail.

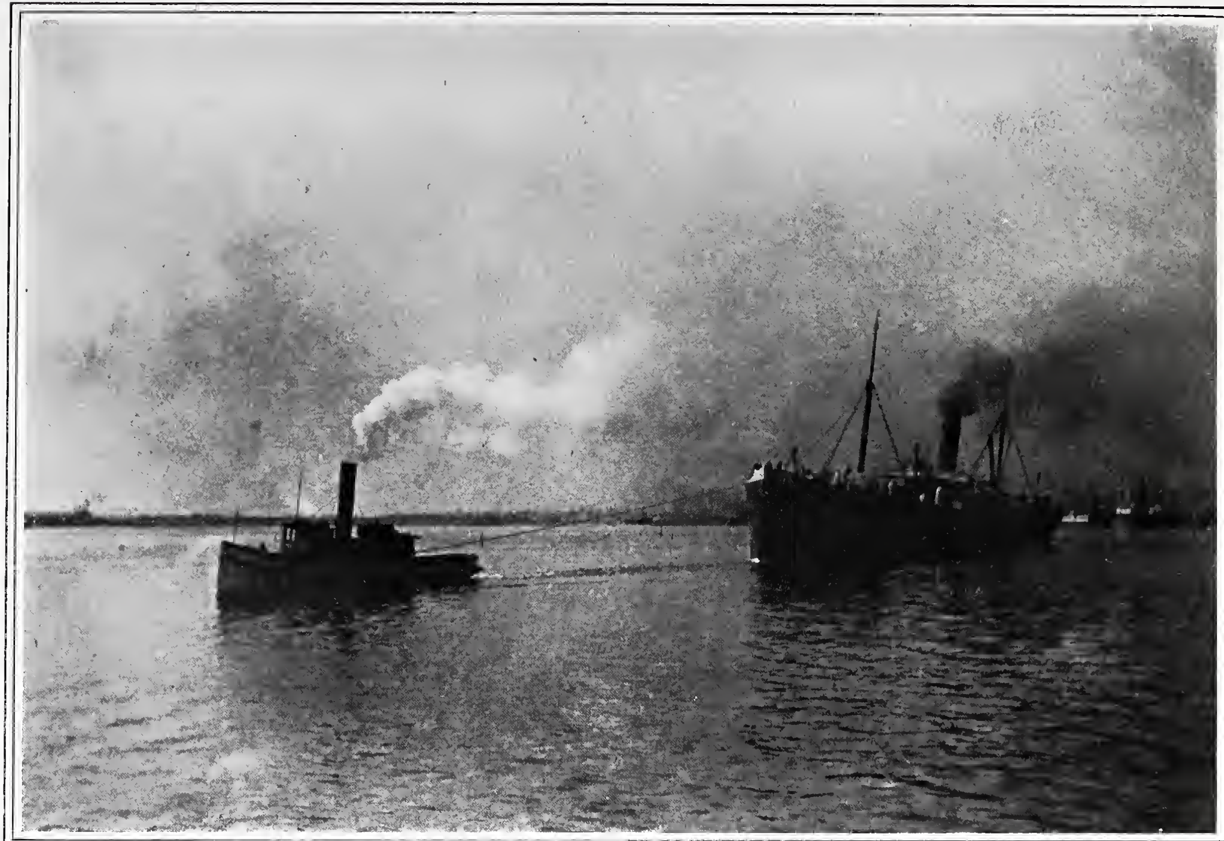
We will presume that the amateur develops his own plates, and as this would be a rather irksome task after a hard day's work, the plates are generally packed aside until

FAIRY TALES. Mrs. J. E. Bennett.

a more favorable opportunity offers itself for developing them, yet we would make one suggestion, which is to develop a plate occasionally, especially when a frequent change of locality, under different conditions of light renders the proper time of exposure a very perplexing question. It should be remembered that the intensity of the sun is not the same for all seasons of the year, and different portions of the earth and the occasional verifying of the exposure by developing a plate will save many a good picture.

In concluding, I would make one more suggestion: The plate holders should be numbered, and a record kept of each exposure, and same numbered consecutively. When unloading the holders, a small label, such as is used as thumb labels on lantern slides, is glued to the glass side of plate, and its respective number marked on it. If, after this trip is over, and one wishes to develop any particular plate, there is no vexatious delay in finding same, and withal, if a doubt exist concerning the exposure, the plate can be more intelligently developed.

REMEMBRANCE OF OTHER DAYS. W. O. Emerson.



TOWING IN. George L. Beam

FOCAL PLANE SHUTTERS.

By H. W. HALES.

O. C. Conkling.

FOCAL plane shutters are slowly but surely working their way to the front and one does not need to be a prophet to predict that in the course of a few years there will be nothing else used for instantaneous work, especially high speed work. Usually the worker who tries one for the first time is not only agreeably surprised at the speed that can be obtained but the clearness and brilliancy of the negatives are also a revelation to him. Much of this quality is undoubtedly owing to the entire absence of diffused or stray light on the plate while making the exposure, which is almost always the case with the ordinary shutter between the combinations of the lens. Another thing that many owners of fine anastigmat lenses have found out, is that it does not pay to have just any one tinkering with the lens while adjusting a shutter to it, and there is no doubt whatever that really good lenses are often ruined by a careless workman. The sooner, however, that owners of anastigmat lenses dispense with shutters in them, the better it will be. No anastigmat lens of high speed can give its owner the satisfaction it should, when used with a shutter between its combinations; and when a worker gets used to a focal plane shutter, he will at once wish to abandon all other types. I am aware that many consider the focal plane shutter a rather large or clumsy article, but there are so many advantages that the earnest worker can better afford to carry the slight extra bulk—for it is not a *heavy* shutter—rather than to miss or lose so many fine snap shots, which he must necessarily do if he uses the ordinary shutter in the lens. Another advantage which the focal plane shutter has is that it is seldom out of order, but if anything does happen to it the repairs are easily made. This is more than can be said of many of the shutters now in use, as some of them are a perfect nuisance in this respect. The writer of this has a stereo film camera of a noted make and the shutters have been adjusted or repaired about five times in six months.

If this is the case with careful treatment what might be expected if the camera was subjected to the treatment usually given by a traveller or tourist? If any reader of this has been obliged to send his lens and shutter to the maker several times for repairs (and they now seem to be made so that no one else *can* repair them), let him get at once and use a focal plane shutter. He will not be obliged then to send his valuable lens a hundred miles or so, with the defective shutter, and the quality of his work will be better, even if he is obliged to use a lens cap for time work.

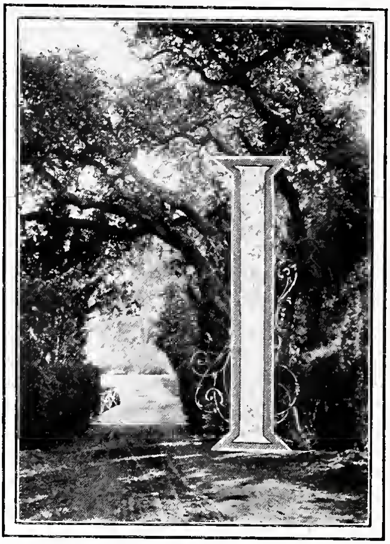
In plain words, give the focal plane shutter a trial and I think you will not willingly use any other kind.

COME LEBEN. A. S. Hull.

"TIMBERLINE." Minnie L. Heplinger.

PHOTOGRAPHING A RAILROAD.

By JAMES F. RYDER.



ENTRANCE TO THE HUNT PALACE IN OAKLAND. Edgar A. Cohen.

IN the spring of 1862, when the Atlantic and Great Western Railway was in course of construction, tapping the New York and Erie at Salamanca, N. Y., running west through portions of New York, Pennsylvania and Ohio, I was called from Cleveland to meet Mr. T. W. Kennard, chief engineer and builder of the road, at Meadville, Pa., the then headquarters of the company. Mr. Kennard was one of the brightest business men I had ever met, and a fine amateur photographer. He was from London, Eng., and the road was being built mostly on English capital. That purchasers of shares could feel a greater sense of actuality from seeing photographs rather than from drawings upon white paper in big sheets, was so apparent to Mr. Kennard that he engaged me to go over the road from Salamanca to Akron, O., and the Franklin branch from Meadville to Oil City. Having arranged preliminaries and received instructions to photograph all the important points of the work, such as excavations, cuts, bridges, trestles, stations, buildings and general character of the country through which the road ran, the rugged and the picturesque, I was turned over to Mr. H. F. Sweetser, the General Superintendent, who on learning my wants turned me over to the Master Car Builder with instructions to him to fix me up with what was necessary for the work. It was determined a wrecking car would best fill the bill. The wrecking car is a caboose at one end, and platform with a crane for use in hoisting and clearing up wrecks through the other part of the car. As the crane would be more a disadvantage than a help to me, it was taken off—the car run into the shop and I was invited to say what should be done with it. I had a good dark room built in a corner, strong shelving and even a water tank and developing sink in the dark room. In the center of the caboose I had rather a large table to do our work upon, clearing our plates, making collodion, varnishing negatives, etc. Nothing could be finer or more complete than our outfit. Our train consisted of engine, new and bright from the works at Paterson, N. J., the tender and our wrecking car. Our crew was Zenas Russell, conductor and engineer, a fireman and a brakeman, myself and an assistant from my establishment in Cleveland. We went up or down the road as we chose, in search of good spots for the camera. We had only to keep out of the way of all other trains. The time table, the universal guide to all stations and trains was our guide. Side tracks were our haven when other trains were near. The very newness of our engine was, to Mr. Russell, an objection. He told me one day while lying on a side track waiting for the express that all engines had to be "broke in." Admitted ours was a beauty, but said she had things to learn. He was displeased that he was obliged to take her. Said they were giving him too many new engines to educate, and when he had "taken the kinks" out of them they would be given to some less skilled man. He said all new engines must be treated as babes—they had to be petted and nursed; had to be "eased up" or "tightened" until their bearings became worn and easy, and until they knew their master; said to take an ignoramus machine and train her to a bit of intelligence, a man grew to admire and love her. A good engineer is naturally "proud of his girl," as he called his engine, and dislikes to have another fellow take her off his hands. It seemed to me there was a sort of running fight between Russell and "his girl" throughout the time we were photographing the road. It seemed to me too if he happened to be out of sorts with me, he would vent his displeasure upon his engine. We had nearly finished up our work of viewing when one Saturday evening we were at Meadville with the expectation of remaining over Sunday and starting for Akron on the following Monday morning to complete the work. It occurred to me I would like to spend Sunday in Akron with some friends I had there and asked Russell if he would make the run that evening and be on hand to do the work early Monday. No objection being made we started within a half hour. The road being somewhat new was not very smooth. I noticed this fact as we went spinning along more and more rapidly. I remembered at Adamsville seeing a caution posted at either end of a high trestle spanning a deep ravine, for trains to go slow. We must cross that trestle, and at the speed he was going I was very anxious. Bottles, funnels, negative racks and whatever happened to be upon the table were dancing so violently it kept myself and assistant very busy in trying to prevent breakage. During this activity it occurred to me Russell was "taking kinks" out of his girl and a second thought told me he wanted to stay with his family in Meadville over Sunday and I hadn't thought of it before. It really seemed to me that engine was running on one foot at times. We had that from side to side swing gait that a monster runaway-a-way elephant might have given. We arrived at Akron without mishap. I went to the hotel and to bed without having a conversation with Russell. My hair did not "turn white in a single night," but I shall never forget the Adamsville trestle. Meek and humble came Russell on Sunday with apology and explanation. He said he felt obliged to put his girl under the lash for her crankiness. He trusted I would forgive him and not report him at headquarters.

The views I made for the company were fine and satisfactory. For months I was kept busy printing from the negatives, and shipping to New York office for London.

Overflow from "Voigtlander and I, in pursuit of Shadow Catching," by James F. Ryder.

IRONING DAY. Alex Keighley.

THE CORNFIELD H. B. Parker.

STUDY. Oscar Maurer.

SPRING HOOKS FOR BELLOWS AND CLAMPS FOR PLATE-HOLDER.

By O. G. MASON.

STEPS UP HAYBORN HILL, FRANKLIN PARK, BOSTON. A. W. Watriss.

WHILE on a recent short vacation I had an opportunity for spending several hours in the workshop of those ingenious mechanicians, Alvin and Abbott Lawrence, of Lowell, Mass., where, among curious devices for measurement and recording of time, clocks which tell one by soft, musical chimes how fast his sands of life are going into the past, while others drive care away by some sweet melody of musical genious, or the beat of a pendulum electrically conducted from some distant point. In this shop one would hardly expect to find anything of interest outside of horology.

But here the student in photography may see much to interest and instruct, as both father and son are accomplished amateur photographers, and their rare mechanical skill has enabled them to add many curious and convenient items to their photographic apparatus. Two of these I have been using in my own working outfit, and find them so useful that I here illustrate and describe them for the benefit of my fellow craftsmen.

All who use long-bellows cameras know how perplexingly the bellows will sag and cut off a part of the field unless some kind of support is put under the central part to keep it up in line; this is most excellently done by the hinged-spring hooks seen on each side of the box in several of the illustrations. This sagging is shown in Fig. 4, and its correction by the hooks in Fig. 5. Another important use for

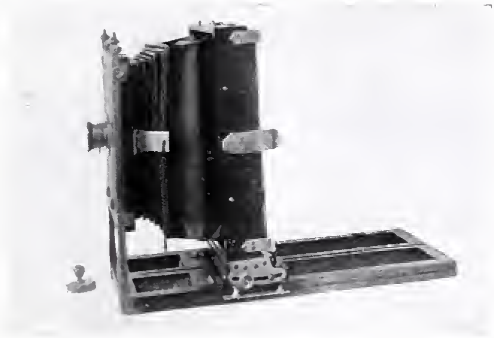
I.

these bellows-hooks is to prevent cutting off of the field by sagging of the folds of the bellows at the plate-holder and when the bellows is partly closed for working with short focus wide angle lenses, as seen in Fig. 2 and corrected in Fig. 3.

II.

The camera used in the illustrations, being only of medium length, does not show the importance of this device as well as it should.

Who has not experienced trouble by *sliding* his plate-



III.

holders into his camera after getting everything nicely adjusted; or in hooking it on with hooks hard to reach, and quite likely to open when the slide is drawn. This annoyance is entirely avoided by using the plate-holder spring clamps shown in all the illustrations.

Fig. 1 shows construction of spring and hinged-bellows hooks and the simple method of attaching them to the box. When the camera is closed for packing or transporting, the hinged-bellows hooks are held open by a cord (or, in my own case, by a light chain), which passes round the front of the box. The cost of all is slight, but the convenience great.

IV.

V.

GENEVA LAKE. W. J. Wisdom.

HERE'S TO YOU. H. P. Bailey.

AN ATTIC TREASURE.

By MARIAN GERTRUDE HAINES.

DAY DREAMS. W. and G. Parrish.

DEEP down in the big wooden chest, among the banished crayon portraits of the family an old album was found, and many a dreary day, when interest in things within reach had been exhausted, this battered and ignored old attic treasure came to the rescue and prevented useless sighing for things out of reach.

In childhood those days usually occurred on Sundays, especially rainy Sundays, when the weather entered the field as an ally to that forbidding foe to all my natural inclination—the strict rules of the holy Sabbath.

Its magic power still holds sway on days, when the rain is within, a thick drizzling mist falling on a tired soul. Instead of being called Sundays, these are known to the most of humanity as "blue days." On such a one I now open it and come face to face with my great-great-grandmother. After considering that very large and unyielding mouth, and the keen eyes through those big bowed glasses—I can't imagine either shoes, sleeves or even glasses being allowed to cramp her—I feel sufficiently near and dear to her at a distance of five generations.

I believe she survived her better-half some twenty years, at least he did not come up to the daguerreotype period, so I have no visible means of knowing whether opposites always attract in matrimony or not. I certainly hope so.

His place beside her is filled with the quaint, genial face of my paternal grandfather. I can't quite trace any of his features in the act of smiling, yet the smile is undeniably there. He must have been one of those people who never have to say anything clever; but who somehow make you feel, that should they deign to speak, it would be a remark of surpassing piquancy. His neck-tie makes me feel quite akin to him—one end is much longer than the other, and the bow is a little on one side. My acquaintance with him was very limited, occurring as it did in the very early days of my existence, and the last days of his.

Over the page is a cabinet of grandmother, but I need no picture to describe her. She still lives and is as rosy and kissable in her ninetieth year as are any of her granddaughters.

Now we come to the numerous aunts, uncles and cousins. Some I am sure are as remote as great, if not great-great from me. As a class they belong to that period of fashion when both men and women took a much larger garment pattern than present up-to-dates, even considering the length of "prince alberts" and the quantity of puffs and ruffles of the prevailing fashion. Their cast-off clothes would easily make the rounds from biggest brother to number ten. Some look less stern than others, in fact quite sweet and mild in spite of the straightest of straight-laced Quaker training.

To break the rigid appearance of these pages, the considerate person who arranged the pictures, slipped in a few most interesting specimens of old fashioned childhood. Somehow they are all little girls. I am glad, because the small boy of that period, with his knee trousers to his shoe tops, was not half so picturesque as the little girl with her low neck and short-sleeved frock. They are all pretty, plump little maids, with an extravagant number of curls securely held in place with a ribbon or circular comb.

Two of these pretty creatures were presented to my youthful days as models for conduct. One appeared to have come straight from the shelf of the Sunday School library, for she was so very, very good, that she was called upon to leave this world at the age when gaudy tea-sets and big china dolls were most alluring. So these were left for such wicked little girls as myself to look at, and once upon a time I was actually allowed to touch them.

The other (whom it was the prayer of my mother I should never be like) was very vain and naughty, but nevertheless much prettier. And, as I look at her now, standing with one little dimpled arm on a big fringed chair, with her dress slipped over her shoulder, she seems entirely unassuming and innocent, and I look in vain for evidence of her vanity and naughtiness.

The next few pages reveal the charms of mother and father in their seminary days, in company of some friends and sweethearts. Strange, but the most pleasing picture of mother is where she is standing beside the same befringed chair as the above mentioned little "Vanity Fair" stood. She was evidently a very self-possessed and dignified young lady, and with the exception of the style of her hair (pardon me, mother dear, but it looks for all the world as if you had forgotten to take down your crimps), her youth and serenity are quite unchanged. Her dress is where the difference appears, for I know she could not be hired to wear to-day anything half so voluminous and in the way as that gown.

Somehow all the young ladies of that time seem remarkably mature. I only find one that displays any symptoms of youthful giddiness; she really looks as though she might be tempted to converse on other topics than Euclid or physics. Perhaps her freshness of countenance was due to the fact that she enjoyed more hours of sleep than the other girls. This I gather from the natural looking curls about her face, and the wave of her front hair, which is quite unlike the sleekly brushed straight front locks of her friends, who are nevertheless adorned with masses of ringlets about their ears.

I have tried to unravel the mystery of those lovely curls, but it always results in the same mental picture—a very tired young woman, who has spent hours carefully wrapping every six hairs of her head around bits of clothes line. At least I can't conceive of any other way to produce such a quantity of "cork screws." Just think how distracting their dreams must have been, with all those rat-tail arrangements pressing the brain! How indebted the present generation should be to the inventor of the curling iron! The staidness of these young women seems complimented with plenty of frivolity and conceit in the young men. They all have an air of "being strictly in it" about them. Here's one, arrayed in a long black coat with gleaming satin revers, with trousers to match the bigness of his coat, and, that he has convinced one pretty maid of the truth of the above statement, is all too evident. There remains not the slightest doubt, judging from her smiling submission to his affectionate embrace, in spite of the photographer's presence, and all the eyes of the album lookers.

Had those been Kodak days, one would think it a trick of an unscrupulous Kodak fiend. It is such a perfect likeness of the promise to "love and obey." Think what happy times for the photographer not to have to go out for his "snaps."

That happy couple, and the neighboring one, suggests to a present-day mind the ad. "before and after taking." The latter picture must have been taken a long time after the original "promise," for it is most evident that she is there simply because of a well established habit of obeying her Lord and master.

There he stands beside her chair, a literal embodiment of the second chapter of Genesis, with all the complacency becoming to one having dominion over the entire earth! His big hat reposes on a small table at her other side, leaving scant room for the timid little figure, with fear in every line of her face, lest she might be taking too much of his room.

Poor tiny bit of "Wife" island, all but submerged by the great roaring "Husband" ocean!

The next and last pages are devoted to the cousins and friends of this generation. But their up-to-dateness is too uninteresting to note.

I hope I have not been disrespectful in expressing my enjoyment of these time honored likenesses. But somehow I am reminded of Orphan Anne's admonition to those "who laugh and grin, at all their folks and kin." So I comfort myself with the thought that the treasured book itself will testify to the truth of these observations wherever it is found.

ILLUSTRATION FOR "EBEN HOLDEN." Clarence H. White.

GOOD PIN-HOLES.

By C. H. CLAUDY.

TIRED. Louis Fleckenstein.

PIN-HOLE photography, once despised and laughed at as a childish pastime, or at most a curious and interesting but utterly useless phase of the art, is now in the ascendent. Serious workers have taken it up, oftentimes first as a fad but generally from a thorough understanding of its possibilities, and it is now the wholly satisfactory means of artistic expression used by many a photographic artist.

With a greater comprehension of the principles and practice of pin-hole photography has come an increasing demand for exact workmanship in the various kinds of pin-holes employed. Shoving a pin, of any size, through a piece of cardboard, of any thickness, no longer serves him who would dispense with the lens.

Let us examine a little into the reasons for this and see how the best pin-hole can be made.

It is essential that the hole be round, otherwise there will be uneven illumination. A practical demonstration of this fact is found in the use of the "duplicator," which, applied over a lens, decreases the illumination on one side to zero. For the same reason it is essential that the edges of the hole be smooth. They must have no feathers of lint, or of the material through which the hole is made, attaching themselves to the edges. Finally, the thickness of the material through which the hole is made must be of a dimension many times less than that which measures the diameter of the hole if we are going to be able to include any considerable angle of view in our picture, and if we do not want distortion and fuzziness caused by reflections from the sides of the tiny tunnel.

It will be seen at once by reference to these various requirements that the choice of material narrows down to one which will have an even texture, which can be tooled very thin and still be opaque, which will not be difficult to work with simple tools and which will be reasonably durable after it is put into shape. Taking in consideration all the necessities, brass is about the most satisfactory material to employ.

The following method of making pin-holes, while by no means the only one, or even, perhaps, the best one, is simple and convenient and requires only such tools and materials as are usually available to every one.

A piece of fairly soft brass is selected of the required dimensions. If several holes of varying sizes are wanted on one bar, take a piece half an inch wide and two inches long. If every pin-hole is to be mounted separately, have the pieces three-quarters of an inch square. With a rather blunt-nosed drill, about a quarter or five-sixteenths of an inch in size, recess this piece of brass wherever a hole is wanted, until a finger placed on the opposite side of the brass can feel the pressure of the drill.

This much is preliminary. The actual making of the hole requires a little further preparation. It is about time to state that "pin-hole" does not mean what it says, but "needle-hole" instead. Holes made with needles are not only more accurate and better cut but are also of a given and predetermined size. The best sizes run from that made by a number eight needle (a large hole) to that produced by a number twelve, which is amply fine enough for very sharp definition. *New* needles of this size are secured therefor, and their eye-ends stuck into corks which are then labeled with the needle size in pencil.

To make the hole, take the smallest needle, and gently, *very* gently, prick through the thin skin of brass in its center, then withdrawing the needle. Enlarge the hole from the other side a little, not much, and keep on going from back to front of the brass piece until the needle will just go through and turn round in the hole. Be very careful not to slant the needle but to hold it as nearly perpendicular to the plane of the brass piece as possible.

This much accomplished, try to view your work through a microscope of low power, or, if that is not convenient, through a magnifying glass. If your work is well done there will not be *more* than a hundred shreds or brass clinging in and around the hole. These shreds of brass it is now your business to remove. The work can be accomplished by blowing, by the very delicate use of a very fine wire and by the careful turning of the needle in its hole. Great care should be exercised in this work, for if the hole is enlarged beyond its known size, you will never be able to properly estimate the exposure by the tables published for that purpose.

In making the larger needle-holes, it is well to commence with the smallest needle and gradually work up to the largest, as it tends to reduce the dirt around the edges of the hole.

In using the needle-hole, be sure you have the inside of the brass piece—and preferably the outside, too—well blackened. Holding the brass over burning sulphur is advised for this, but any of the blackening enamels will serve. Never, under any circumstances, try to clean the hole with a thread or by rubbing the plate with anything. Your breath or a wire are the only things which will not put in more dirt than they take out.

The brass plates are, of course, to be mounted on a front board in any way the fancy of the maker suggests. A shutter can be made of an extra piece of brass, but it is a needless refinement. Your finger, or the slide in the plate-holder is usually all that will be needed, as the exposures are so long, ranging from four seconds to all day.

In closing, it may not be amiss to offer a word in favor of the slight diffusion to be found in even the sharpest of needle-hole work. It does not, with a small needle-hole, amount to fuzziness, but it does invariably suggest a subtle and not-to-be-described atmosphere, which no amount of fuzzing a lens-made plate can ever secure. Work requiring the sharpest of definitions, such as copies, reproductions of documents, etc., can be often better done by the needle-hole, diffusion notwithstanding, than it can with a fine lens. The reason is obvious. The lens focusses often sharper than the eye, giving a staring, unnatural effect to the resulting print. The pin or needle-hole, admitting to the plate practically but one ray of light from a given object, is sufficiently sharp for all practical purposes; but the slight margin of diffusion, inseparable from any hole not a geometrical point, much more nearly approximates the scene as seen through the eye than does that produced by an over-focussed lens. Hence the pleasing and artistic quality of pin-hole photographs.

TAMBOURINE GIRL. Frank E. Marks.

Curtis Bell.

CARBON PRINTING.

By W. H. PORTERFIELD.

D. Rosser.

OX TALBOT made the first carbon prints in the year 1853, just a half century ago. This fact therefore makes carbon one of the oldest, if not the oldest, photo-printing processes in use at the present day.

That it has stood the trials of 50 years, and now seems to be on the high road to popularity, is, I think, ample proof of its worth; and this, coupled with the fact that it is one of the least expensive methods of photo-printing as well as the only one by which an absolutely non-fading image may be had (with the possible exception of Platinum), should assure it a permanent place with all those who strive to produce something beautiful; not only beautiful for a day or a year, but to represent truthfully the face of some dear one, or a scene from a favorite landscape, long after the former has passed away and the latter has suffered improvements at the hand of man.

Before venturing on a new enterprise, all wise men stop to count the cost; let us do likewise.

Carbon tissue can be bought in two forms, first in cut sizes (for example, one dozen 8 x 10 sheets selling for $1.25).

This, however, is the rich man's way to buy, because he pays to have it cut for him and does not count the waste which would necessarily occur unless one be using this particular size for all pictures. The other way is in rolls or bands, each band being 2½ x 12 feet, therefore containing thirty square feet, the cost of which is $2.75 or $9\frac{1}{6}$ cents per square foot. At these figures it is easily seen that the cheapest kind of developing paper is more expensive than carbon, not only in the original cost, but cheaper from the fact that there is less waste, on account of the wonderful latitude allowed the operator in this most fascinating process.

Neither has the carbon printer any occasion to burden himself with toners and developing solutions; pet formulæ grow stale and are forgotten, and instead we substitute water.

Of course before an attempt is made at any printing process, we must necessarily give some consideration to the subject, or rather the negative from which we are to work.

Strong, well developed negatives are best. Therefore, in developing, the plate should be carried a shade beyond the depth which is considered proper for bromide papers, the only exception being in cases where one is striving for some particular effect; it then depends wholly upon the judgment of the photographer and his knowledge of the expected results, as to just how long the plate should be kept in the developing bath.

Volumes might be written about this one feature of photography, but beyond imparting a little theoretical knowledge to the reader, I doubt if the time spent in reading would result in as much information as would be gotten by closely observing the development of the first two or three dozen plates.

In speaking of development, I have wandered somewhat from the original subject, so we will make up time by proceeding immediately to what is considered the first operation, the result of which let us hope will be a creditable carbon print.

Sizing the paper, or permanent support of the tissue, as this operation is called, consists in preparing a solution of gelatine and chrome alum; 1 drachm of gelatine and 5 grs. alum dissolved separately; the gelatine in 4 ozs. and the alum in 1 oz. of water. The gelatine is now brought almost to the boiling point in a double bottomed kettle and the chrome alum poured in gently, or drop by drop, stirring it the while with a glass rod.

During the time the sizing is in use, it must be kept well up in temperature. Should you allow it to cool, it becomes thick and unfit for further use.

This solution is applied to the paper (which you have chosen as most appropriate to the subject) by a bristle brush; generally three coats are sufficient, unless an extremely rough paper be used, when an extra coat is given.

As a piece of coated paper keeps almost indefinitely; one can make up his stock at such times as is convenient.

For glass, celluloid, ivory and porcelain, sizing is unnecessary as the carbon tissue adheres tenaciously to such surfaces and many beautiful effects can be gotten with them.

The next operation, that of sensitizing the tissue, is best done in the evening previous to the day on which the prints are to be made. The sensitizing bath is very simple, being composed of only two chemicals, namely bichromate of potash and carbonate of ammonia—1 oz. of bichromate of potash and 5 grs. ammonia dissolved in 16 ozs. water.

In this solution the carbon is immersed for three minutes. It is then taken gently from the bath and laid face down on a piece of clean glass. In this position it is covered by a piece of rubber cloth and a squeegee is used to free the tissue from superfluous moisture. The carbon is then hung up in a dark room to dry, and when dried in the dark becomes sensitive to light. Carbon is a sun printing material, but differs from all others because there is no visible image until after development.

It now becomes necessary to devise same means of ascertaining the time required for the light to act through the negative to produce a print of desired depth and tone.

There are many styles of actinometers on the market for the purpose; but a piece of solio paper exposed to the light under the negative until detail appears in the high lights, is a very simple and reliable way to time the negative. Should a slight under or over-exposure occur, it can be corrected in the development by simply raising or lowering the temperature of the water, as the case may be.

The carbon is now placed in the frame and allowed to remain in the light, in accordance with the time taken by the solio print. This simple operation completes the printing. It is not necessary to proceed with the development, unless the person so desires.

The printing may be done in the middle of the day and then laid aside until evening, but longer delay is dangerous; one of the peculiarities of carbon being that the light action continues to the same extent after the printing is done.

In the present case we will proceed at once to prepare the print for final action.

Take a piece of paper which we have already coated with sizing, and place it in a tray of water, no special temperature being required, but for the comfort of the worker, we will add just enough warm water to remove the chill, remembering of course not to get above 78°.

The paper should be allowed to soak at least a half hour; at the expiration of that time we can proceed to make what is called contact; that is, bringing the gelatine side of the carbon in contact with the coated or sized surface of the paper. This little detail is easily accomplished if we first lay the carbon in the same tray with the sized paper for about one minute; it will then flatten out nicely, become very pliable and take readily to the support.

All that remains now to complete and make a perfect contact is to expel what little water that may have lodged between the two papers.

For this you can use a squeegee; first laying the combined carbon and support between newspapers. A few vigorous applications of the squeegee, lengthwise and across the print, generally releases all superfluous moisture and brings us to a point where heavy pressure is needed to force the carbon gelatine to a more perfect contact with the support. There are numerous methods of doing this. One can use a little press, thumb screws or carpenters' hand screws, first placing the print between two smooth boards. Generally about 20 to 30 minutes under pressure is enough.

If, upon examination of the paper, you find the back of the support has a yellow stain, the size of the print, you may presume the contact is good.

The yellow stain is caused by the bichromate which has found its way through the coated paper and is ample evidence that the carbon tissue is fast upon the other side. In other words the contact is perfect.

The next step brings us to the final operations. For this work we will need several articles, a large deep tray, a piece of zinc or some other light metal a little larger than the print and a small tin cup.

Place the combined print and support in the tray, carbon up, with water from 90 to 100° Fahr., and watch the print until the tissue is seen to ooze about the edges; then by gently lifting one corner of same with one hand, holding the transfer paper with the other, strip the carbon from same and lay it (the support), gelatine side up, on the zinc or tin previously mentioned.

In this position it is easily handled, while development is carried on by means of water at 110° Fahr., poured gently from a tin cup.

The first two or three cupfuls should sweep the whole surface of print; presently the high lights will appear and then it is advisable to direct the attention to washing down the deepest shadows, avoiding the thin parts as much as possible.

When sufficient detail is visible in the blacks, it is then safe to reduce the superfluous pigment in the high lights and generally to even up the print from all sides.

All the foregoing operations have been mechanical to a great extent, but at this juncture the operator has an opportunity to show his artistic sense and to impress an individuality upon his work by which it is easily recognized.

By the careful use of a small brush, a meaningless shadow can be transformed into an interesting feature or an obscure distance brought within reach of the eye; in fact, the possibilities and effects of carbon are limited only by the ingenuity of the worker. With a little practice, clouds can be created in an expressionless sky and a summer sea made to reflect the splendor of the setting sun.

These and many other beautiful phases of nature beyond the reach of ordinary photography are within the possibilities of the expert, who studies the secrets of carbon.

PORTRAIT. Mikks

MOONLIGHT ON THE MERRIMAC. Wm. H. Whitehead.

PHOTOGRAPHY AS A PHASE OF ART.

By HENRY READ.

Belle Johnson.

THE most casual observer must have noticed the growing tendency of photography to claim for itself a mission that aims at something beyond the more or less accurate representation of form—in other words, art instincts have realized its capabilities as a mode of self expression. Hence the salon. But the popularity of this branch of photography is apt to become a source of danger, since enthusiasm is a poor substitute for artistic sensibility, or for its development and guidance. Only those who have gained the power of pictorial expression by years of patient labor, can fully understand the comparatively subordinate part played by the camera no less than the brush in the production of a work of art. Both must be looked upon as means to an end, and that end artistic self expression, not the mere representation of external nature. As an artist, not unacquainted with the powers and limitations of photography, may I be allowed to point out what seem to me some of the weak points in the average picture produced by this process? Photography, notwithstanding recent achievements, while it reproduces with greater fidelity of detail, cannot compete with painting in the power of suppression, change, or emphasis, so that correspondingly greater care should be exercised in the selection of subject. How many photographers, even if they were prepared to admit this in theory, would have sufficient knowledge to carry it successfully into practice ? Many a subject that might form the basis of a great painting would be useless to the photographer, simply because the latter would be unable to reject certain minor but unmanageable features.

In figure subjects another difficulty presents itself. It is a rare thing to find a photographic picture that does not suggest posing, yet deliberate arrangement must be the foundation of all serious art. Here the skill, culture and instinct of the photographer must reckon with the personality of the model. Without a certain dramatic intuition, an absence of self consciousness, and some ease of movement, no model will be more than a lay figure, and the camera will make this fact more evident than the brush.

Motion in animals and figures seems to prove an artistic pitfall for the unwary, who fail to see that its adequate representation does not depend upon the speed of the shutter or of the lens, but must be sought for in the direction suggested by the word "impressionism" in painting. Pictorial art does not concern itself with truth of scientific fact, but with truth of visual impression, and as regards motion it records, not movement, but attitude, from which movement is inferred. This is not uniform as to either direction or speed, and the attitude which makes the strongest impression on the retina is not that which accompanies the quickest, but the slowest action. If we watch a man mowing, the pose which is most expressive to us is that which characterizes the beginning or end of the stroke, at the moment when the backward or the forward swing changes to the reverse; that is, when movement is actually arrested, while the midway action of the stroke when the movement is most rapid, is represented by an attitude which differs but little from that of a figure at rest. Such considerations will afford a glimpse of the difference between scientific and artistic photography, both worthy of the most exact and patient study, but having widely divergent ends in view. The optical qualities of the camera lens and of the eye, to say nothing of the recording qualities of the sensitized plate and the retina, are by no means identical, and when we realize the paramount importance of the human eye in matters of art we shall find that a most interesting field of research lies open before us. Depth of focus, angle of vision, duration of impression, light and color, flatness of field, possess for us a much fuller meaning when we contrast the peculiarities of the human, and of the artificial lens. Our aim in artistic photography should be to use the camera under approximately the same conditions as control the results of human vision, and although it will be seen that artistic achievements of a high order may thus be reached through the medium of comparatively imperfect instruments, it by no means follows that we should undervalue the results of mechanical skill and scientific discovery —rather that we should use them intelligently according to the end we have in view.

Unity of impression is one of the elements of artistic truth, and a narrow angle of vision will be found a most effective aid to its attainment. It is in landscape work that disregard of this principle is most apparent. There are few photographs of scenery that do not contain within themselves a portion which forms a better picture than the whole. Of course we all know the temptation to include just a little more, but restraint in one form or another is characteristic of all good art.

Consider for a moment another instance. A photographer is constantly advised to select a side lighting—very good advice if his object be to explain form, but worthless if artistic beauty be sought for. An artist will look towards the light, and will find pleasure in the breadth of mass and subtleties of value that dominate the scene. To render such effects would be no easy task, but that calls for no reply.

It would be easy to select definite instances to illustrate the artistic errors that mar so many otherwise excellent photographs, but this would leave the root of the matter untouched. Art is not created by rules and examples, but by perception and endeavor, and the object of this article is to urge upon photographers the importance of art study, not in an abstract way, but as a painter pursues it, with constant practice and unfailing zest. To this end it will be found that even an elementary power of drawing will be a valuable acquisition, and greatly outweigh the slight effort needed to attain it. It is an almost indispensable aid to the study of composition, which trains the eye to appreciate beauty of form and grace of arrangement. It may not be out of place to say, that if due allowance be made for its note of protest, a valuable guide to a right understanding of the matter will be found in a work entitled "Composition," by Arthur W. Dow, published by J. M. Bowles, Boston.

To register the commonplace, to consider mere representation as an end, to invent a pictorial anecdote, may on occasion be justified by circumstances; but that any such occupation should claim the sanction of art is to misunderstand the very conditions of its existence. There remains however an important class of work in scenic photography where the technical elements of artistic effect must not be overlooked, but which must remain essentially topographical in character. Such cases do not come within the scope of my remarks, which confine themselves, in a desultory manner, to some of the difficulties that confront the artistic photographer, and show how these may in a measure be overcome by adopting the methods of the painter, by making the camera subordinate to the human eye, and by looking upon it as a means of expression instead of an instrument to record the facts of external appearance.

SLEEPING GIRL W. and G. Parrish.

A FOGGY DAY AT THE DOCKS. J. R. Peterson.

DARK-ROOM LANTERNS.

By CHAPMAN JONES.

PORTRAIT.
Cleo S. Bourgeois.

O far as my observations go, a great many photographers still suffer from an unwise selection of colors in their dark-room lanterns, and use the colors they have to far from the best advantage. For those who use all kinds of plates, including lantern plates, four variations of colored light are desirable, namely: (1) a light yellow, such as given by two thicknesses of the ordinary yellow fabric, for lantern plates and bromide printing, (2) a deeper yellow for ordinary plates, such as four or five thicknesses of yellow fabric, or two of yellow or one of orange, (3) a red for isochromatic plates, such as two or three thicknesses of yellow and one of red fabric, and (4) a deeper red (less refrangible than Fraunhofer's C, or about that) for the special red sensitive plates, such as Cadett's "spectrum" and those of Lumière, but there is no ready means of providing for this except by getting a "safe-light" screen provided for the purpose. To use a red light for ordinary plates is to waste light and strain one's eyes, with nothing but disadvantage in return.

Having a suitably colored screen it is desirable to make the best possible use of it, and not to handicap it as so many do to their great discomfort. A large lantern and a good light in it may give a more brilliant light and at the same time a safer light than a small lantern with the same illuminant. It is quite certain that other things being equal and the fogging power of the light equal too, a lantern with large windows and a good light within, will give more light than a smaller lantern or a poor light within. Night-lights may be convenient for small portable lanterns, but if they give a useful light they are not safe, and if safe the illumination is so small that it is hardly worth having. A good light well screened with large windows of the most advantageous color, is the principle to get the best and at the same time the safest illumination of the dark room.

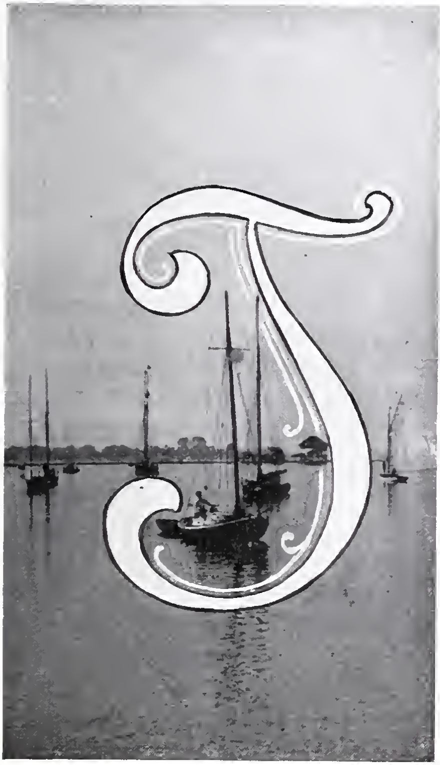
THE OLD LIGHTER. Frank M. Ingalls.

STUDY. J. C. Strauss

PORTRAIT. C. T. Wernwag.

SOME PRESENT AND FUTURE POSSIBILITIES OF THE CAMERA.

By Lieutenant Commander ALBERT GLEAVES, U. S. Navy.



W. H. Porterfield.

TO the military and naval man the photography of the near future is of special interest. When it is possible to go into the fighting top of a battleship and by means of electricity obtain an accurate photograph of an enemy's fleet eight or ten miles distant, or from a vantage point in the offing transfer to films by the mere touch of a spring, an absolute picture of shore fortifications and light houses—or when on shore depict the enemy's camp, and the movement of his troops a score of miles away—the vexing problems of campaigns and strategy will be greatly simplified.

Bold as are these suggestions they are well within range of the photographic possibilities of the next decade. A few years ago nothing could have seemed more impossible than photographing the bones in the hand, or an object behind an opaque screen, and yet to-day a radiograph is as common as a portrait, and Professor Goodspeed's recent discovery which enables him to make photographs by light reflected from his hand, leads further afield into new investigations which promise to be of great value and of far reaching importance.

From the simplicity of the pinhole camera to the complicated apparatus of the biograph is a long cry, and in between, the path is strewn with a multitude of interesting inventions, which have made the art-science of photography the most facinating study that commends the attention of the diletante or the serious.

Nothing escapes the eye of the camera. In the hands of a master it pierces the inter-stellar spaces, and brings to earth undreamed of worlds; it descends into the sea and from inaccessible depths brings back beauties of nature that otherwise would remain forever unseen; it soars among the clouds and from its eyrie records a marvelous panorama of town and country, the curious inversion of which suggests those ancient people of Dean Swift's, who built their houses from the roof downward.

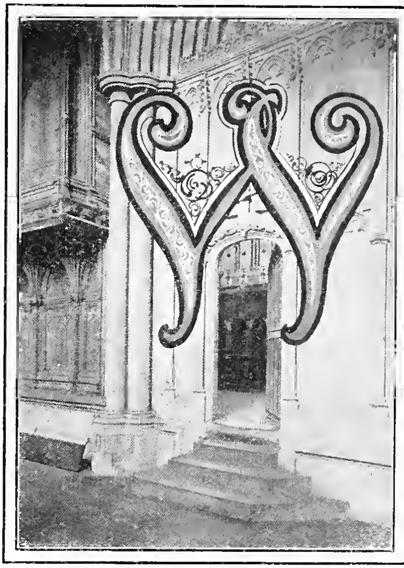
It should be a matter of congratulation, that largely due to American ingenuity and the skill of manufacture, the practice of photography is now literally within the reach of anyone who desires to learn it. Unlike the automobile it is not a luxury or the peculiar property of the rich; it belongs essentially to the man in the street. Furthermore, the recent successful introduction of the daylight-developer robs the camera of its last inconvenience, and this will add largely to its number of disciples and widen its influence in every direction.

THE SHORE. J. R. Peterson.

ONE WHITE DREAM OF SNOW. Thomas A. Morgan.

ST. ALBANS.

By T. PERKINS.

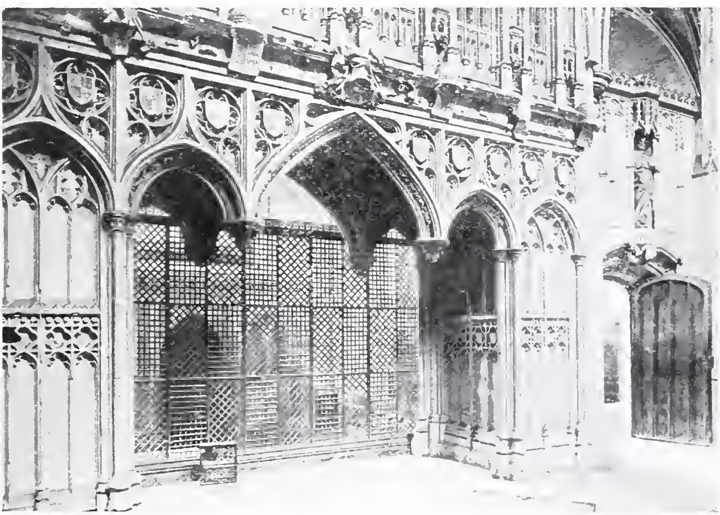


ENTRANCE TO SHRINE OF ST. ALBANS.
T. Perkins.

WITHIN reach from London by a railway journey of half an hour, followed by a walk of about fifteen minutes (for it is only twenty miles from St. Pancras station), stands the Cathedral Church of St. Albans, where the photographer who cares for architectural subjects will find a splendid opportunity for work.

Probably many who have not seen it, but have heard something of the controversy that raged over the recent restoration, have an idea that Lord Grimthorpe has utterly ruined the building. It is true that, although he probably saved it from becoming an absolute ruin, he has done irreparable mischief there, and made the north and south points of the transept hideous; yet there is much still remaining untouched, and both outside and inside there are features that would be sought for in vain in any other building in the world.

Many who seek it, accustomed to the richness of the carved work of the later Norman style, the flying buttresses and crocketed pinnacles of the thirteenth and fourteenth centuries, may be disappointed at the first sight of the long roof of the nave, the longest in the country, the plain walls unbroken by far projecting buttresses, the long rows of almost uniform windows; but gradually the building impresses the beholder by its sternness and simplicity; it stands well, a few hundred yards from the summit of a long ridge of hill, on its southern side which slopes down to the River Ver, from which the old Roman City of Verulamium took its name. There are two distant views of the church which are particularly impressive, one from Verulam Woods and the other from the southeast from the field in which the ruins of Sopwell Nunnery stand. This latter spot should be visited after sunset, when the tower stands up in all its stern majesty against the yellow sky. The tower is cer-



MONUMENT.

tainly the most striking feature of the exterior view. It was once covered with rough-cast, but this has been removed and the warm red of the large thin Roman bricks of which it is built gives it a delightful old world air. The Roman City of Verulamium which stood beneath the hill to the west was the quarry from which building material for the church was largely derived. This store of ready made material accounted for the short space of time in which the church was built, and the fact that it was brick, not workable stone, accounts for the absence of ornamental work to be noticed in the nave. The Norman piers are massive and are destitute of carved capitals; the arches have no moulding, but are recessed in simple order with rectangular edges. Even when the thirteenth century abbots began to reconstruct the church from the west end they did not care to change the heavy character of the building. The four western bays on the north side of the nave, and the five western ones on the south side, were rebuilt in the thirteenth century, but everything is as plain as possible. No clustered

FLEUR DE LYS INN YARD.

columns, no detached shafts of Purbeck marble are to be seen, and when later on, two bays of the remaining Norman work fell and necessitated the rebuilding of all the eastern part of the main arcade on the south side, the decorated pillars differed only in detail from the early English ones, so that the unpracticed eye would scarcely know that they were not all of the same date. In the rebuilt clerestory and triforium only is ornament to be found. The eastern part of the church was reconstructed in the fourteenth century and here greater lightness and grace prevail.

The story of the building must be briefly sketched. During the persecution under the Emperor Diocletian a Christian priest or deacon by name Amphibalus found refuge in the house of a young Roman soldier named Albanus, then stationed at Verulamium. During the time that the priest was in hiding he seems to have converted his host to the Christian faith, and when he could be no longer hidden, Albanus changed clothes with him and Amphibalus escaped to Wales where, however, he was at last caught and brought

ST. ALBANS' CATHEDRAL.

back towards Verulamium and put to death a few miles from the city. Albanus was of course taken in the priest's garments, and being charged with having aided him on his escape, declared himself a Christian. He was led out across the river not without sundry miracles and beheaded near the top of the hill where the church now stands. After awhile a small chapel was erected on the spot, then a larger church, and in course of time Offa founded a monastery, retaining the then existing church. After the conquest the Norman Abbot Paul of Caen pulled down the old church, and built the one we now see. It consisted of an aisled nave with possibly two western towers, transept, and central tower; the eastern part which was subsequently altered consisted of seven parallel halls, each with an apsidal eastern termination. All this work was done in eleven years, 1077-1088. In the thirteenth century John de Cella set about reconstructing the western portion of the church, but funds fell short; it is said he was cheated by the workmen he employed, so he had to stop, and his successor, William of Trumpington, went on with the work in a less ambitious manner. The junction of the early English work on the north side with the original Norman is noteworthy. The church, it must be observed, was purely monastic and not intended for the use of the laity. A church was built for lay use on the north side of the north aisle towards its western end, separated by a row of arches from the Monk's church. There were three western doors, but no porches either on the north or south of the Abbey church. The massive Norman arches of the nave and the frescoes on the pillars are worthy of notice.

It will be seen that the eastern part of the structural nave formed, as at Westminster, the ritual choir. Passing eastward of the screen which now forms the east end of the parish church, on which the western part of the nave is, used, we can walk along the south aisle to the transept and standing under the tower look along the four arms of the cross. To the west is the choir, to the north the northern end of the transept with Lord Grimthorpe's ugly circular window; to the south we see an equally objectionable window due to him, consisting of five lancets of equal height. Seen, however, from the outside the central lancet is the tallest, and those next to it taller than the other two. The upper part of the three central ones being shams—to the east the magnificent fifteenth century screen filled with modern statuary. The altar piece is a most unique piece of work by Alfred Gilbert, R. A.; a representation of the resurrection in high relief, Christ in the center, an angel on each side with wings of mother-of-pearl, partially hidden by grilles of brass scroll work. The altar is not yet in place. Ramryge's chantry on the north side and Wheathampstead's on the south should be noted. Behind the screen is the next compartment of the church, the Saints' Chapel, containing in

CARMEN. H. P. Bailey.

its centre the shrine of St. Alban. This was destroyed at the time of the reformation, but the fragments of its base, collected from many places, have been put together again. On the north side is the watching chamber of beautiful carved oak, from whence a monk kept watch outward over the precious shrine. Opposite is the canopy of the monument of the good Duke Humphrey of Gloucester, built by Abbot Wheathampstead. Beyond the Saints' Chapel is the retro-choir, containing much modern work, for at one time there was a public roadway running through it, and still further to the east, the Lady Chapel, vaulted and decorated by Lord Grimthorpe. This built in the fourteenth century was, after the dissolution, used as the Grammar School. It is now used for service, the school having found a home in the great Abbey gateway to the west of the church. I have now mentioned the chief objects of interest in the church with the exception of the banded balusters, probably taken from the Saxon Church, which may be seen in the triforum of the transept on its eastern side, and a lovely holy water stoup at the west end of the north aisle of the nave. The church is exceedingly light, and very short exposures will be sufficient for most of the interior views. The tendency will probably be to over expose. The monastic buildings with the exception of the gatehouse just mentioned have disappeared. Traces of the cloister academy may be seen along the eastern part of the south aisle of the nave. The north walk of the cloister in many churches extended all along the aisle but it was not so here. The Abbots' house stood to the west of the cloister adjourning the aisle, so that until recent time there were no windows in this part of the aisle wall.

In the reign of Henry VIII. the monastery was dissolved, the Abbey handed over to a layman, who destroyed most of the domestic buildings, and probably would have destroyed the church had it not been bought by the parishioners for use as a parish church. The enormous building was too expensive for the parish to keep in good repair, hence it fell into a sad state; this gave some excuse for the drastic restoration of the second half of the last century. In 1877 the building once Abbey, then Parish Church, was raised to

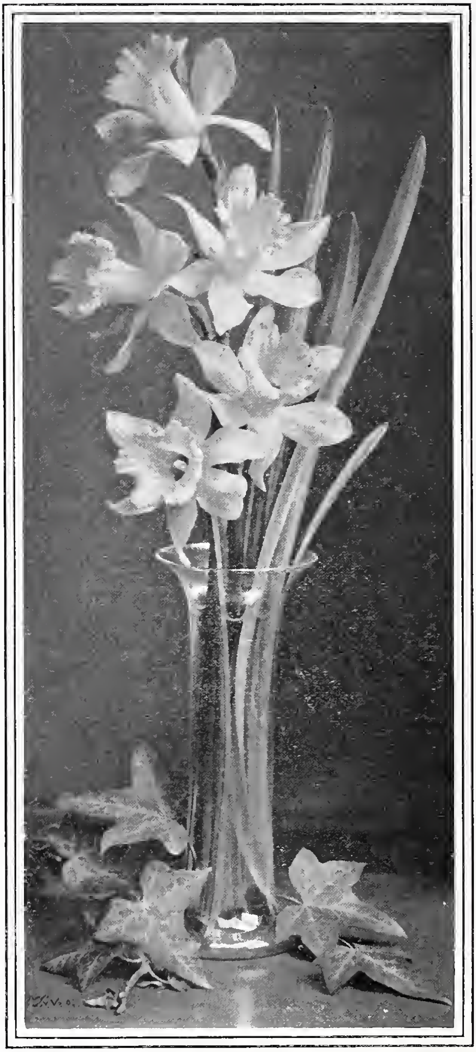
Cathedral rank on the division of the populous diocese of Rochester into two parts. At first there was neither Dean nor Canons, but recently the rector of St. Albans was installed as Dean; no chapter exists, nor is there any paid choir, hence the week-day services are of a plain character.

When the photographer has done full justice to the church (I myself on a recent visit found sufficient subjects for the exposure of over fifty plates), he will by no means have exhausted the photographic wealth of St. Albans. There are three old churches, St. Peter's, St. Michael's and St. Stephen's. Restoration has left few if any features of interest in the front of these. St. Michael's stands at the bottom of the town and within the area once enclosed by the walls of Verulamium. Until recently it could boast of a Saxon tower which unfortunately was pulled down a few years ago. There still remain, however, a half timber gable at the east end, a fine carved oak pulpit, and the monument of Francis Baer, Lord Verulam, who is buried here. To the south of the city, down the road known as Holywell Hill, and a short distance beyond the London & North Western Railway Station, stands the picturesque church of St. Stephen's in a pretty churchyard. But the churches are not the only antiquities of the city. In several places old gabled buildings giving quite a foreign or mediaeval appearance to some of the streets may be seen. There are some old hostelries still standing. The old Peahey has recently been entirely rebuilt in a picturesque style and is a most comfortable and central house to stay at; the George contains some ancient rooms; the "Fleur de Lys," a humble inn near the clock tower, should be visited and a plate exposed in the yard. French Row close by will also demand at least one plate. At the lower end of the road that runs down from the city through the great Abbey gate, is an octagonal building known as the old round house where the monks kept their rods and nets. It is now an inn with the sign of "The Fighting Cocks;" at one time in accordance with the name it bore and still bears, cock fights took place here. It has been frequently sketched and photographed.

There are remains of the old Roman walls to be seen in Verulam woods, and in the early spring time the woods themselves afford subjects for photographs. The best time of the whole year for a visit to St. Albans is somewhat late in April.

The photographer who rides a cycle will find good subjects too numerous to mention in the villages which lie within a distance of about half a dozen miles from the center of the city. The Homeland Handbook to the City of St. Albans gives full information concerning these.

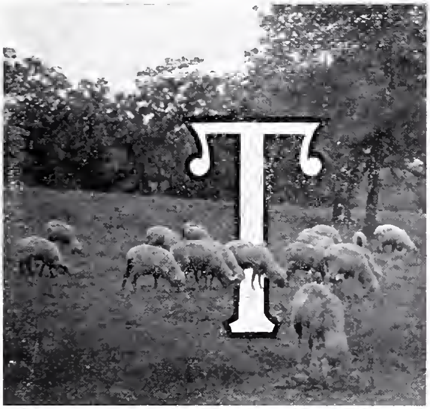
FRENCH ROW.



J. H. Whitehead.

JUST A SUGGESTION.

By HARRY B. MASON,
Associate Editor of the "Bulletin of Pharmacy."



SHEEP FEEDING. Robt. E. Weeks.

THE thought that I shall offer may perhaps be worth a moment's consideration. Over and over again I have been impressed with the fact that amateurs who have scores upon scores of clever and interesting prints have never striven to bring them together systematically in any order. A few years ago, when bicycle touring was more common, many amateurs spent their vacations on the wheel and took their cameras along with them. The next few months were spent in developing the exposures and making prints, and in the end a complete pictorial history of the trip was secured.

But were these prints used to the best advantage? I think not. Each print was mounted separately in the customary way; piles of the mounted prints were thrown carelessly on the table or into a box; and after they had been glanced over by friends and acquaintances they were put away to make room for others that kept coming out in ever increasing numbers. I know this has been my own experience. I have many sets of interesting prints. They represent different trips taken from time to time, and different eras of experience. I have, for example, many photographs of the Pan-American Exposition, any number of sets of vacation pictures, and still other prints which call pleasantly to mind the different places in which I have lived during the last ten or fifteen years.

The other day it suddenly dawned upon me that all this mass of photography was in such shape that it really gave me very little pleasure; and with this thought an idea was suddenly given birth. Why not systematize and co-ordinate these pictures and give them some permanent and convenient form? Sinee then I have thought the plan out a little more in detail, and shall soon set about the execution of it. In a word, I intend to make new prints of all the negatives that I care about, and, arranging them in series, mount them in books or albums. It is quite likely that I shall not be able to find such books on the market as will best serve the purpose. If so, I shall have them made. I have a pretty definite idea of what I want.

Most of my prints are 4 x 5s. I shall probably use a page of such size that it will accommodate four of these prints. As I have already intimated, the photographs will be arranged in a series of groups. Each group will be indicated by a running title at the top of the page in the manner followed in every printed book. Then a brief description of every individual picture in the group will be written under that picture. Moreover, it is quite possible that a more or less lengthy description of each group as a whole will be written on two or three pages immediately preceding the presentation of that group. This will make the groups more readily understood by friends, and will refresh my own memory as the past sinks further and further away from recollection.

Of course this will mean a good deal of work, particularly since I am so late in beginning the execution of the plan. Once I get it up to date, however, it will be a very simple matter to keep it up. I shall then simply have to paste in new pictures as they are made instead of mounting them in the regular way. If I had only started the scheme years ago, it would have caused me no extra trouble; and it is to give others the advantage that I have lost that I am putting the suggestion in print now. If the plan strikes you favorably, do not wait too long. The longer you wait the greater the work will of course be.

One always thinks his own children are the brightest and the best in the world; and this is true also of children of the fancy. It is therefore quite possible that I am more enamored of this plan than others may be. Whether this be so or not, I must confess to being very much fascinated by it. Before many more months go by I expect to have at least three or four books which will be full of interest and delight. They will, in a sense, be a pictorial history of the last ten or fifteen years, and will call to mind many friends and scenes of days gone by. And I expect the interest to deepen as the plan develops and the books increase in number and variety.

SAN GABRIEL. Mrs. C. M. Hassle.

THE KNOT Myra A. Wiggins.

PROGRESS IN SKIAGRAPHY.

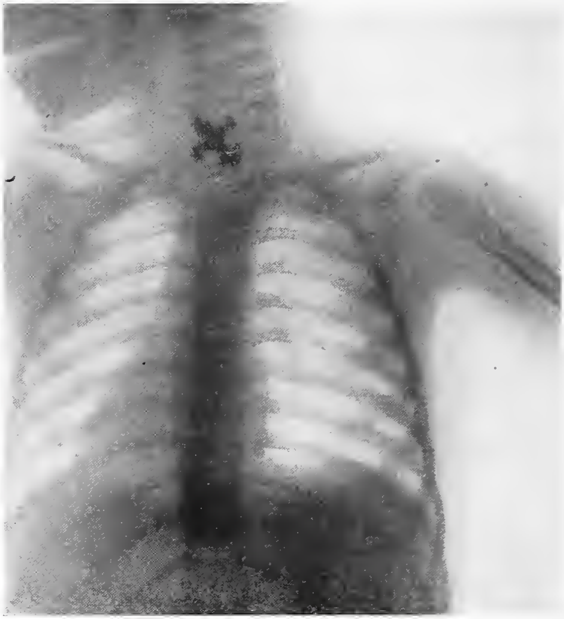
By JOSEPH F. SMITH, M.D.

DAFFODILS, C. M. Whintey.

THE discovery by Prof. Röntgen of Würzburg, in 1895, of a new form of radiant energy called by him the X-rays, led to the development of a new photography which has been termed skiagraphy, radiography, etc. Since Prof. Röntgen's discovery was announced, little or nothing has been discovered in regard to the nature of this new form of radiant energy. The progress that has been made has been along the line of practical applications of this new and peculiar force and the improvement of apparatus for producing it.

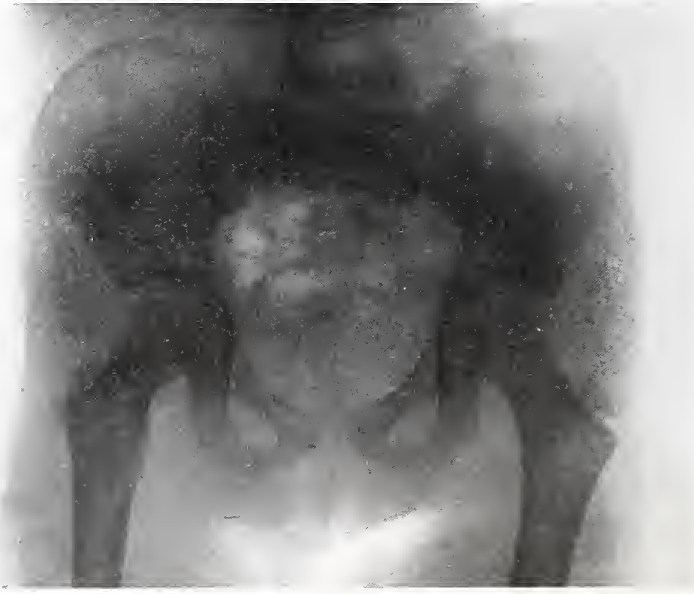
The medical profession early recognized in the X-rays an agent that might be of great value and accordingly medical men have followed closely every improvement in the techinque of the application of the X-rays to their art. In fact, it may be safely stated that in medicine and surgery the X-ray has proved of greater service than in any other field in which this new force has been utilized.

During the last two or three years the great improvements in the coils and tubes used in producing these rays have vastly increased their usefulness by shortening the time of exposure required to secure satisfactory pictures of the thicker portions of the body and the better differentiation of the different tissues of the body and substances they may contain. The building of larger coils and stronger and better tubes makes possible the use of much lower vacua in the tubes thus making possible greater power of differentiation without loss of penetration. In its present



CHATELAINE PIN IN AESOPHAGUS OF CHILD.

Jos. F. Smith, M.D.



STONE IN THE BLADDER OF A BOY 11 YEARS OLD. J. F. Smith, M.D.

state of development the X-ray machine is an indispensable part of the equipment of every hospital or sanitarium where any considerable amount of medical and surgical work is done..

In its present state of development the X-ray is not merely capable of locating foreign bodies in the tissues and fractures and dislocations of bones but gives, when skillfully applied, valuable information in many cases of abnormal tissue development such as tumors, cysts, etc., and in the formation of concretions in tissues or cavities, displacements of organs, accumulations of fluid or gaseous bodies in abnormal places, unerupted teeth, etc., etc. And though not properly belonging to "skiagraphy," this new form of energy has been found of great value as an agent in the treatment of many diseased conditions.

THE APPROACH OF WINTER. T. Henning.

A MARINE HIGHWAY. J. B. GORTON.

ASTRONOMICAL PHOTOGRAPHY AND SOME OF ITS NEEDS.

By C. D. PERRINE.

MEMORIAL BRIDGE, MILFORD, CONN.
Jas. Shepard.

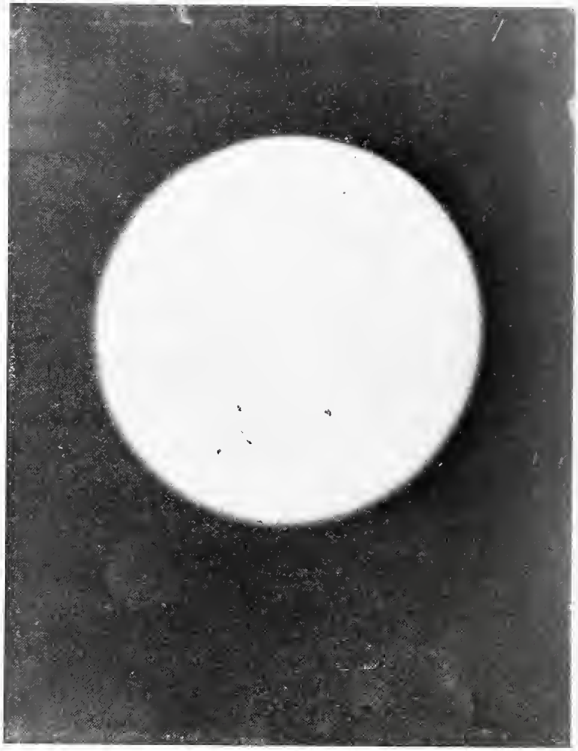
IN complying with the request of the editor of the American Annual of Photography for an article, I shall refer briefly to the progress of photography in the field of astronomy and shall take occasion to point out some of the ways in which its usefulness might be increased.

The first application of photography to astronomical observation dates back more than half a century. As those were the days of the daguerreotype and its excessively long exposures, the application proved to be more of a novelty than a help.

The invention of the collodion wet plate was a step toward the greater usefulness of the photographic plate in astronomical work. With these plates it was possible to obtain good photographs of the sun and with long exposures of the moon and a few of the brighter stars. The negatives obtained of the sun and moon were of great importance and aid in the study of these bodies. Those of the stars were less useful.

It was not until the invention of the rapid gelatine dry plate that the possibilties of photographic observations became apparent. The much greater sensitiveness of these plates and the possibility of continuing the exposure for several hours opened an entirely new field. Not only could the sun and moon be made to record themselves, but the nebulae and comets, as well as the faintest stars and spectra.

Thus it is not over twenty years since photography became a successful rival to the human eye in scientific work. Its field of usefulness has been rapidly increasing and today it has entirely displaced many of the old visual methods



The Sun, Aug. 31, 1893. Negative made with 40 ft. Photoheliograph of the Lick Observatory, Univ. of California.

of making observations. The sun and moon are studied altogether by means of photographs of their surfaces, and the changes going on in the sun, by means of spectrum photographs.

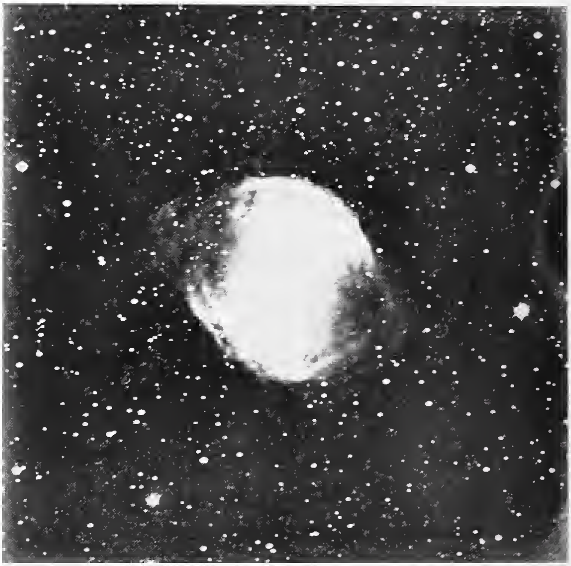
The sun's corona, which is visible only during total eclipses, yields observations by photography which can be studied at leisure and to far greater advantage than by visual means during the two or three minutes of totality. Photographic observations have the immense advantage of being entirely free from all personal bias and of being permanent records which can be consulted at any time.

From merely recording the same things seen by the eye, photography has advanced until now many things are recorded on the dry plate which have never been seen. Faint stars and the delicate structure in the nebulae and in the tails of comets are readily photographed, which are not visible in the largest telescopes.

One of the greatest fields of usefulness for photographic methods in astronomy is the obtaining of photographs for accurate measurement. This is the method used in making the great astrographic catalogue; a piece of work which is being done by a large number of observatories. Photography is also the means used in making the observations for determining the velocities of stars in the line of sight. Photographs of the lines in their spectra are taken and measured, furnishing results of much greater accuracy than it was found possible to secure by visual methods. It is in this line of sight work that the greatest accuracy of photographic measurment has so far been attained. It is this field that calls for the greatest precautions and for still greater improvements and discoveries in the photographic art. The requirements for landscape work, with the exception of the reproduction of the natural colors, are almost completely met by the plates and processes already known. Plates are so rapid that very short exposures only are required in most of the work; the processes of developement and reproduction are many and satisfactory.

The requirements in astronomical work are quite different. Color reproduction, the one great desideratum in ordinary photography, is of secondary consequence in astronomical observations. Impressions of some portions of the spectrum are obtained by staining the plates. The *positions* of lines and bands are wanted and not their actual colors. It would, however, be of great value if dry plates could be made of equal sensitiveness to all portions of the spectrum. The important considerations in astronomical work are, rapidity of the plate, fineness of grain, a developer that will bring out the utmost detail, and freedom of the background from chemical or other darkening. These requirements are sufficiently met for the purpose of landscape photography but are far from ideal for astronomical work.

The exposures necessary to bring out the structure of faint nebulae, are very long, often of three and four hours duration, and for some special objects, ten or twelve



The Dumb Bell Nebula—Enlarged 7.4 diameters from a negative made with the Crossley Reflector on July 31, 1899, with an exposure of 3 hours.

hours. These long exposures are attended with difficulties, many of which would disappear if the necessary light action would be secured in one or two hours. Beside the great saving in time and the consequent increase in the amount of work that could be done, the negatives secured with shorter exposures would be of greater excellence and would show structure which is now lost through blurring due to difficulties of guiding during very long exposures. Faster plates would enable photographs to be taken that would, doubtless, reveal new objects and unknown phenomena.

It is equally important in the development of the plates that the last particle of silver which has been affected by

HEAD STUDY. Lee Hamilton Keller.

light, shall be precipitated, otherwise part of the exposure is lost. The sky background of the plate should, at the same time, be as clear as possible—thus permitting faint contrasts to be detected.

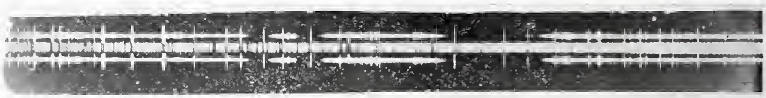
Next to rapidity, the greatest need is for plates having the finest possible grain. Many of the photographs obtained in astronomical work, require to be enlarged many fold, either directly by photographic processes or under the high power microscopes used for their measurement. It is a well-known fact that the grain of gelatine dry plates varies with their sensitiveness, the more rapid plates having the largest grain. The most rapid plates now in use have grains about 0.00010 inch in diameter. Such grains require to be magnified only 20 or 30 times to become easily visible. As such a size is comparable with that of the finest structure in the objects photographed, it becomes impossible to enlarge beyond a certain limit with any gain.

On the photographs made with the Crossbey Reflector, the smallest star images are 0.002 inch in diameter which corresponds to two seconds of arc. The measurements of these star images are made to 0.00001 inch or *one tenth of the size of the grains composing the images.* It is evident from these facts that the accuracy of the resulting measurments of photographs at present depends principally upon the smallness and perfection of the images to be measured and that the grains of our commercial dry plates bear too large a proportion to the size of the images and to the uncertainties of measurment.

Experiments have been made here at various times with different formulae and developing agents with a view of obtaining the best suited to our needs. It has, however, not been possible to go extensively into this matter of development nor to attack the more important questions relating to the plates themselves. Recently some experiments have been made for the purpose of testing some of the new developing agents and more particularly the methods of "tank development." These experiments have confirmed the previous conclusions that Hydrochinon is the best agent for bringing out the utmost detail and for freedom from chemical fog. With one exception, tank development has not proved superior to the method of quick development. All of the plates developed by the tank method (using a number of different developers) showed more or less stain.

From what has been said, I think it will be evident that there is a very great need for improvement in the photographic plates and processes used in astronomy. A very much more sensitive and at the same time, grainless, plate is required. If either one or both of these conditions can be supplied, no greater boon could be conferred on astronomical photography.

One other problem is of special interest in connection with the measurement of star images where they are of widely differing magnitude. Some good method of reducing locally the sensitiveness of a plate is needed, so that the



Spectrum of Polaris, 1899, Nov. 19, (Enlarged 8.3 diameters) showinging displacements of its lines due to a motion of 19 kilometers per second toward the earth. The comparison spectrum of iron is shown on either side of the stars spectrum. Lick Observatory, Univ. of California. Taken by Prof. Campbell

images of bright stars may be obtained of about the same size as those of faint stars, on the same plate. If possible the means of this reduction should be such that the resulting image will be formed by light of the same *color* as are the images of the faint stars; in other words that the *quantity* of the light shall merely be reduced without changing its quality. The method should also be such that it could be applied to a very small section of a plate and the plate subsequently developed without impairing the images of the faint stars near.

Some of the investigations indicated above could be undertaken by amateurs and chemists, while others would best be done by the manufacturers of dry plates or in the fully equipped laboratories of universities. It is hoped that the needs here expressed may meet the eyes of those who have the opportunity to take up such lines of work.

STUDY. Count W. von Gloeden.

ASHORE IN SAMOA.

By WALTER BURKE, F. R. P. S.

ONE of the recent additions to the United States territory is a part of the Samoan (Navigator) Islands, situated down below the line, on the way to New Zealand. The mail boats of the Oceanic Line, from San Francisco to New Zealand and Australia, call every three weeks, coming and going. The American coaling station is Pago Pago. It is a beautiful harbour, said to be the old crater of a volcano. A run ashore, while the steamer is there, armed with a camera, will be found most enjoyable and some fine bits of tropical scenery can be secured.

The natives are handsome, very graceful, light brown in color and with large expressive brown eyes. They are good photographic models, willing and glad to be of assistance; but, of course, if they do much expect to get something in return. The best way to get over this difficulty is to provide oneself with a lot of small change (not coppers), and if it is thought of before leaving the previous port, a number of cheap toys should be procured for the kiddies.

As you approach the shore you notice the whole surface of the Island is tinted a delicate green. As you get closer in, this

resolves itself into the waving tops of the Cocoanut Palms. They are beautiful trees from forty to fifty feet in height, without branches, running up in a straight shaft surmounted by a clump of feather like fronds which wave and twist with every breath of wind. Just below the fronds the cocoanuts may be seen, oval in shape, but not much like those usually seen in shops, which are stripped of the outer husk.

How to get the fruit down is the question that perplexes the tourist, To a native boy it is child's play. He gets a piece of bark, makes a loop about twelve inches in length and passes one foot through each side. This helps to give him a grip of the tree trunk with his feet, then clasping the trunk with his hands, he, by a succession of monkey-like jumps soon arrives at the top. Breaking off the number of nuts required he drops them and follows down the trunk with a speed which makes one apprehensive for his safety.

Then tearing off the green husk, he breaks the shell with a stone and presents you with a bowl of Nature's lemonade—cool and refreshing—just the drink for the climate. The milk no more resembles that obtained in stale commercial cocoanuts than City milk does that got fresh from the cow.

The sun-dried flesh of the nut, known as Copra, is sent away in enormous quantities, to make its appearance later

in various forms. The oil got from it is much used in the manufacture of high grade soaps.

The Samoan houses are picturesque dome roofed places, open on all sides, but with heavy mats hung round which can be dropped if the weather is boisterous.

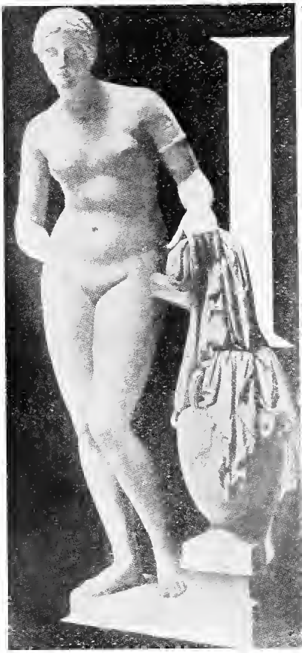
A splendid holiday can be spent in the Samoan group and I can recommend anyone who has the chance to visit them not to miss the opportunity.

GULLS. Oscar Maurer.

THE PRACTICAL USE OF THE NUDE.

By DR. R. W. SHUFELDT,

Cor. Member, Societa Italiana d'Antropologia, Etnologia e Psicologia Comparata, Florence, Italy, etc., etc.



VENUS OF THE VATICAN.

IN order to achieve the best and most enduring work in any department of art or science wherein the human figure is employed it becomes necessary to exhaustively study and compare the forms of actual models, be they men, women or children. It has been through such studies that from the dawn of history sculptors, artists, modelers and artisans having to do with sculpturing, painting or designing the human form, have gained their distinction and reputation, and given to the world works of art of the highest order and merit. Where, throughout all time, the votaries in those vocations have ignored and neglected to employ the actual model in their works, whatever the nature of the work may have been, have sunk to the plane of mere copyists and imitators of the renowned pieces and canvases given to us by the real masters in the realm of art. The most superficial researches and comparisons in those fields will at once convince the student of art, and the biographer of sculptors and artists of the truth of this statement. In fact it goes without the saying. No painter or sculptor of other animals, other than man, who had any regard for the truth in the matter of portrayal of the subjects to be produced, or individual success and recognition would for an instant think of undertaking any particular piece of work entailing

SNOW SHADOWS. Dr. Geo. W. Norris.

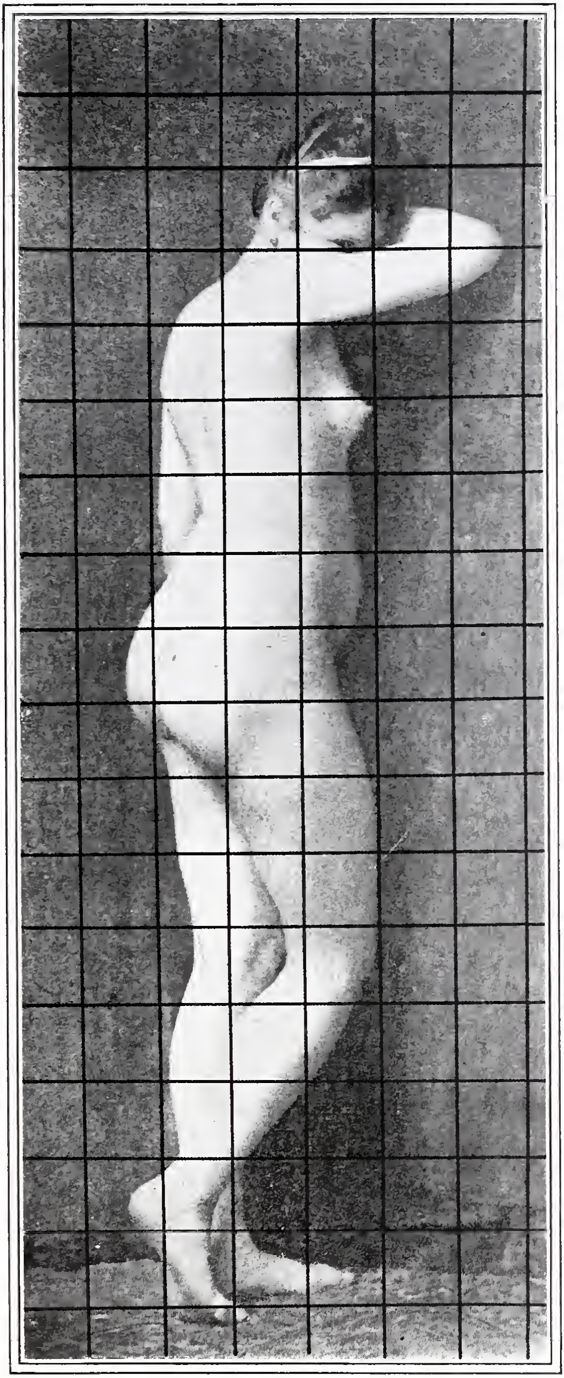


Fig. 1.—MODEL PHOTOGRAPHED TO SCALE.

in its execution a strict fidelity to nature, and what is true in nature, without first having carefully studied the living form or forms. This rule applies with equal force to the correct reproduction of the human figure in art of any character.

Years ago I was permitted to visit daily at the studio of Mr. Johnson during the hours he was engaged at his work. He was the modeler and maker of the widely celebrated Johnson statuettes, and they made him very famous. In one of these Washington and his horse were introduced, and in modeling the latter, Mr. Johnson not only had any number of fine pictures and photographs of horses from life hanging where he could constantly see them in his studio, but he had obtained various plaster-of-Paris casts of the flayed cadavers of finely shaped horses, presenting all the superficial muscles and other parts to assist him. Not only this but he had measured to my certain knowledge no fewer than thirty-three of the best horses in New York City and its vicinity as affording additional data to be employed in making the particular animal upon which he was then engaged. At the time he constantly studied the forms and movements of horses while he was on the street or out for exercise in the country. The consequence was that his statuette was, when completed, a marvel of accuracy, as it was a true work of art.

Let one compare the lions, the eagles, the alligators, the elephants, and the rest which have been sculpt or painted without the proper employment of a sufficient number of living examples of those and other species, with others wherein the sculptor or artist has employed them, and mark the difference. The contrast is only too apparent, and the latter productions invariably are far ahead of the former, from whatever viewpoint we may regard them. Again I say, most emphatically, that the same principle embraces the study of the human form in art of every description. Rare indeed is it for us to meet with any exception to the rule,—men in art, for example like Sarony who could with marked accuracy draw the human figure without the employment of a model, but I have always contended, and do still, that is his case, as in all similar ones, the power to do so was due to the fact that he had critically studied so many thousands of nudes and draped and semi-draped human figures through his camera. Add to this a skillful pencil or crayon, a fine retentive memory, and a good knowledge of superficial anatomy, and the reason for it at once becomes evident. Some few zoological artists possess the same qualifications, but I can assure the reader that they are very few and far between.

Fig. 2.—ARABIAN GIRL FROM CAIRO.
(By the Author after Strotz from Pluscknow.)

But in scores of instances, and in many studios and various kinds of educational institutions, it is very often neither convenient nor practicable to employ the actual model in the art work, whatever its nature, being prosecuted. The living lion and the eagle are not always available, and sometime still less so human subjects, men women, or children, which are suitable to be used for art models, or are willing to be employed as such under special conditions. That is nude or semi-draped. Often the young artist has trouble in securing these, as they do in the art departments of a great number of the public schools, and art classes elsewhere, especially in the smaller towns and cities where such facilities and necessities are often rare or barred altogether.

Of course it is always an easy matter to procure material in more or less abundance, of those parts of the human body which, as a rule, are not covered with the clothing worn,—such as the head and its various features, the hands, but far more exceptionally the feet. Some people will not allow their feet to be portrayed at all. I could never get a Navajo Indian in New Mexico that would permit me, even under the offer of a reward or bribe, to photograph his or her naked feet. It was strenuously objected to invariably.

But I must come closer to my subject now for as a matter of fact in this article I desire to more especially invite attention to what the science of photography is capable of doing for art, sculpture and science along the lines indicated in the preceding paragraphs. Of course in the practical study of the undraped or semi-draped human figure the artist and sculptor and those of related ilk, travel along a little different line from those followed by the art photographer of the nude.

When an artist or a sculptor, for example, employs the actual model in his work it is more or less of a tedious and prolonged sitting. The model stands by the hour on the rostrum, sometimes for several days. During these ordeals, they sometimes are obliged to hold themselves or their limbs in constrained positions. Often they have to submit to being measured over and over again. Occasionally the artist or sculptor, more particularly the latter, resorts to taking plaster-of-Paris casts of their limbs or other parts to assist him in his work. Then, in the matter of accessories, the artist and sculptor, as a rule, in connection with his model only introduces these to the extent of the ones that come in contact with the model's contour. For instance, if the figure be that of a woman supporting by her hands a jar upon her head, the jar is actually so held; but if their be another jar upon the ground not in contact with her body, and in no way affecting the picture or other composition by light or shade, it may be introduced afterwards on the canvas or in the piece. In other words and on the other hand in photographing the nude subject the art photographer is obliged not only to take well into consideration the entire matter of light and shade, but he has in addition thereto to pose his model, and arrange all the accessories employed in the very manner he expects to have them appear in his resulting negative, and in a way to ensure the effect he strives to obtain.

Fig. 3.—A TANGIERS DANCING GIRL.

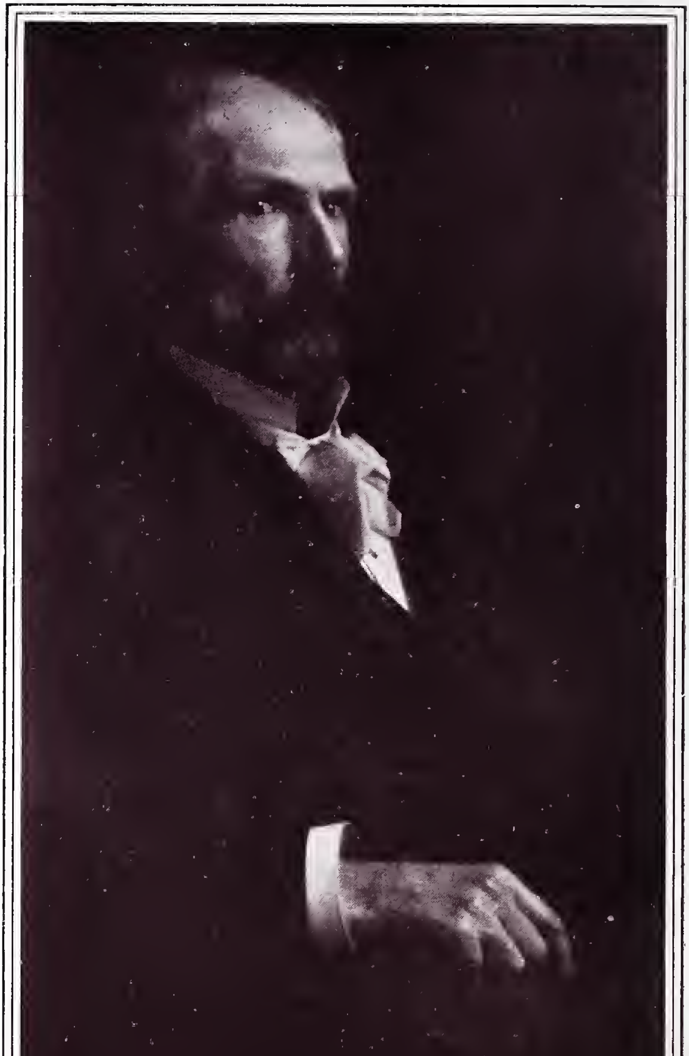
The correct and artistic photography of the nude human figure is a matter of no easy accomplishment, yet one, for no end of reasons, to be sought for, greatly desired, and highly important. The writer has made quite a number of attempts in this direction with a varying success. To a far greater extent have I photographed living wild animals, and that under many conditions, making a series of several hundred successful negatives. But I am free to confess, in so far as my experience carries me, I have never met with any animal in nature, mammal, bird, fish, or reptile, that has taxed my patience more, made a greater demand upon my skill, or entailed a keener use of sueh artistic sense as I may possess, than has the nude figure of the human subject, whether it may have been a man, a woman, or a ehild. This is espeeially true of the untrained model. On the other hand when success erowns one's efforts in such an undertaking, to me no result in photography gives sueh infinite satisfaetion. What, in the way of value, natural and realistie photographic pictures of all kinds of animals and plants are to the author and student in Zoölogy so are, in equal value, careful and scientific studies in photography of the nude human figure to the sculptor, the artist and the designer who employ material of this kind in their works. There is no form in the entire realm of nature so fascinatingly beautiful, so charmingly suggestive, or one that appeals more forcibly to our highest instincts, than the graceful, well-balanced and proportioned figure of a nude woman;—one taken at the prime of her life, in full health of mind and body, with classic features, and whose contour lines have evolved and been developed under the good influence of purity of thought, all that is best and highest in womanly endeavor and effort, and molded upon lines of all that is to be accomplished by sound sense in dress and by the correct scientific principles in diet and physical exercise. I refer, of course, to the most-exalted type of the Caucasian woman, and the ideal I have in mind can only be compared, and that in a way, with the undraped figure of a manly man, of the same race, presenting the corresponding qualifications and characteristics of his own sex. Little babies and children, too, when thus captured by the camera, and shorn of all raiment, when taken in perfect unconsciousness of attitude, and embodying all that purity and innocence means in their every feature; as well as in their very being, possess but few rivals in the animal world. Artistic photographs of these little creatures ; so enticing and lovely in every way, stand among the most enduring triumphs of the art.

Very frequently I have been asked the questions,—What use can we make of such pictures as these ?—and if they really be useful, how does one proceed to secure them? I would preface my reply to such questions as these by saying that, in the first place, the artist photographer should be fully equipped in every way to produce the very best of them. Personally, he should be one possessing great tact, marked refinement in the matter of taste, magnetic, diplomatic, of an artistic temperament, pure-minded, and commanding a knowledge of human and comparative anatomy as well as the canons of ancient and modern art. And, above everything else, in photographing the nude human figure, the aim of all aims that should actuate one in every step of the work, is to keep in view the fact that your photograph, when completed, meets and fulfill an object having for its end some definite use. Its use may be a purely esthetic one, and in this its appeal is very far-reaching and of decided value. On the other hand, the use of such pictures may be purely of a practical nature. Often the two can be combined, and when this chances to be the case, happy indeed are the results, for there can be no more desirable union in art or out of it than to have the result of one's labor embody the twin characteristics of beauty and of use. When the photograph is lacking in either one or both of these components, the figure at once sinks to the level of the lewd and is only deserving of our most cogent condemnation and unmitigated censure and disapproval. Of course in this latter category are not included a certain class of photographs of the nude or semi-nude, intended to illustrate works devoted to special departments of normal and pathological anatomy, medicine, anthropology, the practices of sexual perverts, when intended to be used strictly as scientific contributions to the study of these and allied researches, or to figure in works devoted to such subjects. Photographs of this nature do not fall within the scope of the present article for treatment, as valuable as they are in their own line.

FIG. 4.—THE GREEK SLAVE BY HIRAM POWERS.
Photo. of the Original by Dr. Shufeldt.

For all practical purposes we should limit the size of our photographs to five by sevens or five by eights, and rarely exceed an eight by ten negative. Pictures of these dimensions can be reduced to any smaller proportions that may be needed, and it is not often that larger ones are demanded than the eight by tens, unless they are made purely as art subjects, or for some painter or sculptor requiring bigger figures, or are intended for mural exhibitions for the use of life-classes in the primary and higher art schools. From camera to chemicals the artist should employ in their manufacture only the very best materials that can be purchased in the photographic market, and every detail of his work should be executed with both taste and scientific accuracy.

Photographs of the species here being considered should as far as possible, and taking the age and sex of the subject into account, as well as the use they are intended to be put, represent their subjects in all conceivable posture and attitudes assumed under any and all conditions and circumstances by the human subject. One can seldom tell when either this pose or that pose will be in demand, or the age or the sex required. To illustrate my meaning, observe the great variety of the attitudes assumed upon the parts of the various subjects portrayed in figures 7 and 8. The first of these,—"The Daughters of Menestho,"—is a photographic copy of the celebrated picture by Fernando Le Quesne, and it was awarded one of the prizes of the Paris salon. The three figures in the foreground are simply superb in their proportions and handling. Any one of them would entitle its painter to recognition, and insure his fame and reputation. Doubtless he employed for his figures the actual model, but for others they may not have been available, and it is under such circumstances that he or she must resort to the use of the best photographs of the nude, and those, too, exhibiting the desired attitudes. Here is one important use for the class of pictures I am describing. In Figure 8, again, we have a second example of the same kind. This is a reproduction of a wonderfully beautiful colored engraving I made several years ago. This rare work of art is by Dietrich, or "Dietericij," as he signed his paintings after his return from the Peninsular, is the artist



JAMES WM. PATTISON. Solon L. Gates.

who painted this highly spirited canvas, and christened it the "Nymphs Bathing." And, the nymphs, by the way, have evidently been surprised by a herdsman who has just come into view on the summit of the cliff of the opposite shore. In the legend on the original engraving we read that the engraving was done by J. J. Van Den Berghe, late pupil of F. Bartolozzi, R. A., the former having dedicated the plate to the Rt. Hon. Earl of Rosslyn, and his coat of arms is engraved in the usual place. I reproduce these engravings and extract the account of them from my work on "Studies of the Human Form," for artists, sculptors, and scientists.

FIG. 5.—VENUS AT THE BATH.
Photo. by Dr. Shufeldt.

Another use for photographs of the nude human subject is to furnish illustrations for books devoted to studies of the form in beautiful women, and fine men, such as have been given us by such eminent and distinguished writers as Dr. C. H. Stratz of the Hague, Holland, a most remarkable series of volumes. In them we not only find scores of reproductions of photographs of the female nude, but a most scientific treatise on what constitutes beauty of form in the sex, and the various means of attaining it. At the present writing even the current magazines of the front rank are publishing articles wherein the female nude figure is being employed in the illustrations,—as witness the article by Elizabeth Dryden on *How Athletics may develope style in* *women*, in such a magazine as *Outing* of New York City, (July 1903, pp. 413-418). This is an effort in the right direction, and although I by no means agree with its authoress in what she considers to be a perfect and an imperfect back, as shown in the figures, I should feel quite satisfied to have been the artist that produced the charming pose seen in the full length nude female figure from life shown in the full-page cut in Figure 4. It is truly a lovely bit of work of this character.

Some large firms in Europe have special departments connected with them dealing with high class art photographs of the nude human subjects alone, and I understand that the demand for these pictures on the part of artists, authors and others is constant and increasing. I know I have sent abroad and bought a number of them for use in my own works, and to supplement the accomplishments of my own camera.

Taken in connection with the study of the round in casts, bronzes, and so forth, the photographs I am considering are of great value in the primary and post primary art classes in various institutions. Very often such schools cannot conveniently secure the actual models, and then these pictures become quite indispensable. Being of a size or sizes easily handled they may be pinned to an easel by means of a thumb-tack, and when properly drawn to scale, are of great use to the students in their art drawings and compositions in which the human figure is included. Students who intend to lead a career in art cannot begin too early in studying as much of the actual model as possible. It is quite as important that the nude human figure should be constantly before them, as it is for an ornithological artist to have bird-forms in nature continually under his gaze.

It is only through the eyes that the object to be portrayed makes its impress upon the brain, and through the operations of the brain the hand itself eventually becomes skilled. It was having the nude or semi-draped figures of the sexes and children ever before them that led to the power to so faithfully reproduce it as was shown on the part of the artists and sculptors of ancient Greece and Rome, and has much to do with their daily art education at the present time. Modern Italian youth often now are more familiar with the correct contour lines of the human figure, than many an American artist or artisan engaged in its reproduction, in one way or another, in this country. Speaking of artisans I mean that class who manufacture all manner of objects in metal, in casts, in wood, in china, in clay and various other materials wherein the human figure is incorporated. Frequently such people employ no model of any

Fig. 6.—THE ODALISQUE.
Photo. by Dr. Shufeldt.

kind, simply designing some conventional form, the evolvement of their own imagination. These effigies are produced by the hundreds and sold everywhere. In their way they are harmful in as much as they are erroneous conceptions, untrue to nature, and continually educate the masses in the incorrect in human figure, and a lack of appreciation of the principle of fidelity in art as in other matters. Were such manufacturers to use series of photographs from life of the actual models, the improvement in their productions would sooner or later become evident, and it would further have the tendency to advance the ideas of the growing generation in art matters, teach them to accept the correct, and to despise and reject the incorrect. Not long ago I chanced in at a rathskeller in New York City, and noticed a man engaged in painting upon the walls a number of life size figures of the female nude. He was an ordinary artisan and his work interested me. He was succeeding pretty well, and coming into conversation with him, I asked him what he employed as models. At first he declined to answer this question, but later on, and satisfying himself that I was certainly not one of Anthony Comstock's detectives, he condescended to bring forth a much used but limited collection of engravings of some of the best known artists in France. They were excellent copies of a number of the Salon paintings, and he was working up his figures from them. In fact they employed an important part in assisting him to earn his living, and support his mother. As I was no great distance from my studio I put myself to the trouble to take the young man over there. I showed him a series of photographs I had that were intended to be used in precisely the same manner as he was now using the French engravings. He stated to me that any number of the designers and more intelligent of his class would be very greatly assisted in their work if they could only secure such photographic models as those he had just been examining of mine, and would be very glad to get them. He remarked that they were especially useful when drawn to scale.

My method of photographing the nude to scale has already been touched upon in my work *Studies of the Human Form*, but I have made fuller illustrations of it since to be used in other connections. The usual way to proceed is to use a white drop curtain in the studio hung in such a manner so as to get the best advantage of the light. It should be of some durable material and marked in squares of four cms. each. Your model stands in front of this as a background, and in reducing on the ground glass of the camera, the scale squares should be brought down to exactly one centimetre each, then you have all the proportions for reproduction in any art work desired. Figure 1 of the present article was made by me to the one centimetre scale but the engravers were obliged to reduce it a little in order to have it come within the page of the present publication. Nevertheless it gives the principle to be followed, and it is very easy of application.

With unprofessional models much time is often lost by the photographer not having everything in readiness when the subject comes to the studio, and then the model on her part, not having been properly instructed, has neglected to remove, a few hours beforehand, all lacings she employs in her clothing, as corset, garters, shoe-strings, etc. The marks of all these are sure to be taken in the picture unless care is duly exercised in this regard. This should be done before coming to the artist, and thus save his time, and not be obliged to sit in the studio for the best part of an hour, as has been done by subjects of mine, waiting for such marks to disappear. Ice water and massage will remove them when they have been forgotten, but that takes time, and time that might be applied to more useful purposes.

Fig. 7.—THE DAUGHTERS OF MENESTHO.
Fernando Le Quesne, Paris Salon.
Photo. by Dr. Shufeldt.

There is a great deal in the etiquette of the studio to be observed on the part of a tactful artist with his models, that the limitations of space will debar me from dwelling upon here, as highly important as it is. Everything should be done to cause the model to feel perfectly at her ease, and to bring out her best qualifications. You should imspire her fullest confidence in you, and get her interested in the nature of the work you are advancing, and the important part that she takes in it. Subjects taken in the open air, are often the finest things secured. A good example of these is the Arab girl in figure 2, while the Tangiers dancer, a semi-draped figure, is a studio picture taken abroad. It is a copy I made of the original, and for the use of the latter, my thanks are due to Dr. Walter Hough of the United States National Museum, at Washington, D. C.

The artist should have at his studio not only the standard works on the subject I am dealing with, but in addition thereto, his own collection of photographs of the best known works of art in history, wherein the nude human figure forms a part. Many of them are extremely useful in the matter of affording hints in poses, and so forth, to be carried out in his own studies, and then again, they are very helpful in the way of suggesting to the models the attitudes you hope to get them to assume. Examples of the class of

Fig. 8.—NYMPHS BATHING.
Photo. of original by Dr. Shufeldt.

photographs to which I refer are herewith shown in figures 4 to 6 inclusive. These were taken by myself at the Corcoran Gallery of Art at Washington, where special facilities were given me for the purpose, and for which I am greatly indebted to my friend Mr. F. B. McGuire, the able secretary of that famous institution. Hiram Powers' Greek Slave is the original (Figure 4), and is a most superb piece of statuary, as every one appreciates who has ever seen it. I was the first person to photograph the Odalisque by the late Jacob H. Lazarus of New York City. It is the original painting and measures thirty-one inches by sixty-one. It was given to the Corcoran Gallery by Mrs. Amelia B. Lazarus where it has attracted very considerable attention. It is a well posed and very attractive figure; many art critics, however, claim that the torso is faulty from the lower lumbar region upward to include the shoulders.

Figure 5, Venus at the Bath, is a cast of the original and well-known statue now in the Louvre at Paris. A large part of the figure is the work of restoration. Pliny states that it was taken to Rome in his time, and it is generally supposed to be a copy of the Venus of Polycharmes.

STORY TIME. W. and G. Parrish.

BOY WITH THE BOOK. J. E. Greene.

A HOME-MADE PORTABLE ENLARGER.

By THOS. L. WINNETT.

G. Edwin Keller.

SPRING time with its prospect of the lengthening of printing days for the photographer, will suggest the overhauling of his apparatus, and the arrangement of his "darkened room," that no stray light should be allowed to enter through undiscovered cracks or pinholes. In my early days of photographic knowledge (or ignorance), I suffered, or my enlargements did, much from this evil. With the audacity, which is the peculiar property of the amateur at home, I had annexed the spare bedroom for the purpose of an enlargement room, and had carefully prepared and fixed over the window, a large wooden frame covered with brown paper, which necessitated the removal of all curtains and blinds. These proceedings, needless to say, greatly upset the presiding genius of the household, and brought down on my devoted head many anathemas of wrath. In the end, my arrangement was consigned to the cellar during my absence at the office, and I had to bethink me of some plan which would not be so objected to by the powers. So, after some amount of experimenting, I made, what has turned out to be a perfect boon, both on the score of portability, and for quickness of working; and as the Editor of the "Annual" asked me if I could contribute something to the store of general knowledge which is always to be found in its pages, I consented to attempt to describe, for the benefit of brother amateurs in like predicament as my own, the home-made portable enlarger.

I have given in the accompanying sketches, the measurements of my own apparatus, but before commencing work it will be necessary to say that the figures relating to the *length* of the enlarger, will depend upon the focal length of the lens proposed to be utilised. My own is a Portable Symetrical, or wide angle, of 4½ inch focus when used in a half plate camera; and in my opinion there is a great advantage in the use of a short focus lens of rectilinear type for our enlarger, as it is then made much more portable. If, however, a short focus lens is not available, the only plan will be to alter the measurements to suit the altered conditions.

The apparatus consists of three boxes, sliding into one another, the lower one being of a tapering form, and the two others of rectangular shape; a little preliminary study of the illustrations, will, I think, make the matter so plain, that it will not be necessary for me to take up much time or space in description.

The first part to be made is the bottom frame (Fig. 1) a section is also given (Fig. 3), and which also shows the method of fixing the sides of the box B. The frame must be carefully mitred at the corners, and a rabbet G made on the inside for the board carrying the 12½ x 10½ bromide paper to be fixed to with the usual pins.

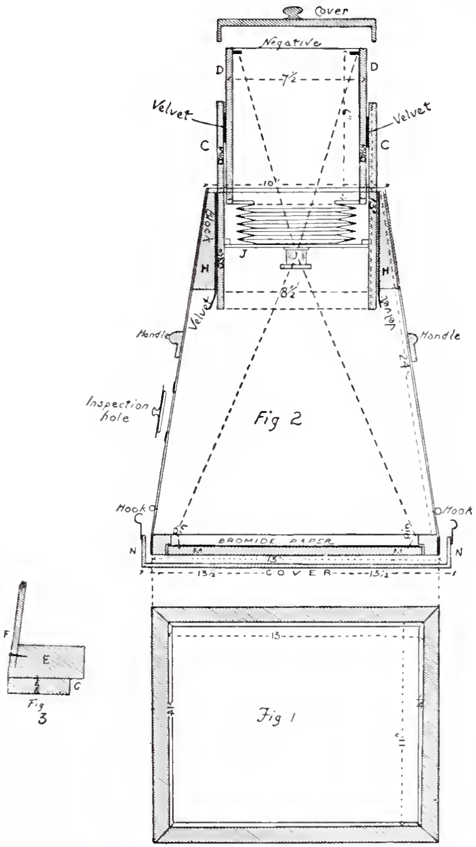
The sides of the bottom box B are intended to be made of planed picture backing, but thick cardboard or millboard may be used, altho' it will not be so durable, and the corners must be strengthened with strips of wood planed to fit the angles.

In order that the box C may slide evenly in the top of B, it will be necessary to fix four blocks H into the inside of B, the inner sides being lined with velvet which must project below the blocks for an inch or two, in order to exclude the light. We will now describe the box C, make this of ⅜ inch deal 13 inches long, the other dimensions being 8½ and 6½ respectively. Be careful to make this box true, otherwise it will not slide easily. The board carrying the lens (J) is to be fixed 4 inches from the end, and the hole for the flange must be cut truly central otherwise the image will not appear in the center of the screen. I have found that the simplest plan for fixing the lens is to obtain an extra flange from the makers of the lens, or any optician, and

A

PORTABLE ENLARGER

by
Thos L. Winnett



in this way the lens is quickly detached when required for other work.

The box C being finished, we may now proceed with a similar one (D) which is to be made to slide within it; but it need not be more than six inches in depth; a strip of velvet must be fixed round the sides to make it light tight. A bottom board will be required for one, and, a square hole 3½ x 3½ being cut in the centre. Now purchase, or make for yourself, a short length of bellows, with say seven folds. If you decide to make it, the job is not a difficult one, and glazed linen and paper pasted together serve the purpose as well as leather. One end of the bellows must be fixed to the lens board (J) and the other end to the bottom board of D. The purpose of the bellows is to allow of focusing the half plate negative which is to be placed in a carrier at K; and if a set of carriers be made to fit into one another, other smaller sizes of negatives may be used when required. A cover L is used for exposing.

The bromide paper is to be fixed to a movable easel M. In order to prevent the latter from warping, I made mine of two-ply fret wood, with a strengthening cleat across the back, which if placed centrally will serve the purpose of a handle. On the other side of the easel, paste a sheet of white paper, and if squares the sizes of the bromide paper to be used, say, whole plate, 10 x 8, and 12 x 10, are pencilled on it, a guide for the fixing of the bromide paper is thus given. In order that the bromide paper may be protected from the light, a loose fitting cover lined at the sides with strips of velvet, must be made of thin wood, and which will be kept in position over the easel by means of a pair of wire hooks, to catch into screw eyes fixed in the body box B.

We may now put the various parts together, and having cut a hole 6 x 4 inches in one side of B, for the purpose of seeing the picture on the easel, and focusing the same, and fitted a rabbeted lid for the same (lined with velvet) we may now place a negative in position in the carrier, of course film side downward, when by throwing a focusing cloth over our head, we may see the picture formed on the screen. It will probably at first be somewhat out of focus, but by sliding the two boxes C and D, the best focus will be soon obtained. It will be of assistance in future operations if the focus be at once marked on the sides of the two upper boxes.

In using the apparatus, the following is the plan of operations I have adopted. If an enlargement of half plate to 12 x 10 be desired, place negative in position, and adjust the focus by the before mentioned pencil lines, then convey the apparatus to the dark room and fix on the easel board a trial slip of bromide paper, replacing the bottom cover; put on the top cap and take the enlarger out into the garden and place on the lawn in a position where the negative may enjoy an uninterupted view of the sky, (not sunlight); expose for thirty seconds (I use Barnet or Wellington rapid papers), and return with the enlarger to the dark room and proceed with development. The correct exposure is soon found. The best stop to use is F.16, and that should be adhered to for all classes of enlargements.

One little addition to our enlarger will improve its usefulness and portability, ie., the fixing of two handles on the sides, about halfway down box B.

All inside work should receive two coats of dead black, easily made by mixing some lamp black with a little thin glue or size.

SAND DUNE. H. B. Parker.

Nat. Ackerman.

SOME FREAKS IN NATURE.

By H. A. BEASLEY.

OPOSSUM. W. H. Fisher.

PLAYIN' 'POSSUM! Yes, that is what our friend the spreading or puff adder plays when he has exhausted every avenue of escape. Turn him over and over two or three times, head him off when he starts for the woods and he soon becomes tired out and rolls over limp and dead, to all appearances, until you cease worrying him for a few minutes when he gives a remarkable imitation of the cat with its nine lives, and unless you watch him carefully he will get away in spite of you. However, life is to short to worry Mr. Adder all day so we will leave him to rest in peace and seek other fields.

Almost every time we take a walk in the woods or along the seashore, if we are observant, we will find something new and strange, animals or birds we have never noticed before although they undoubtedly could have been found if we had known where to look for them. It is always a source of pleasure to find a flower or an animal with which we are not acquainted. That we pass many animals by without noticing them is due in a great measure to protective coloration—the means given them for protection against their enemies. The common lizard furnishes us some fine illustrations of this and unless we have trained our eyes to

SPREADING OR PUFF ADDER. W. H. Fisher.

GREEN SNAKE. W. H. Fisher.

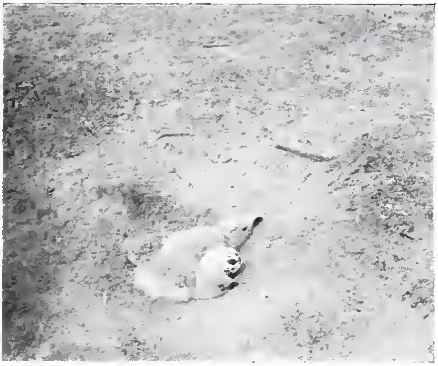
COMMON OR BRANDED RATTLESNAKE.
W. H. Fisher.

SPREADING ADDER OR PUFF ADDER.
W. H. Fisher.

THE NUN. C. T. Wernwag.

such work we are prone to pass many of these interesting little creatures without noticing them. We could well mistake them for "part and parcel" of the trees so well do they match the bark in color.

But if Mr. Lizard thinks he has a monopoly on protective coloration he would soon have this idea exploded if he would wander down to the beach and watch our friends the black skimmers. One is almost led to believe that Mrs. Skimmer has used glue on her young and then sprinkled them with sand so well are the young birds disguised. One of the photographs illustrating this article was secured by the merest accident. The photographer was walking along the beach when his attention was attracted by the high light in the young bird's eye and through this was able to secure this fine example of protective coloration.


EGG AND YOUNG OF BLACK SKIMMER.
W. H. Fisher.

Many of us, no doubt, frequently cut switches while walking in the woods but let us hope that readers of the Annual will never attempt to cut off a green snake for a walking stick—they won't hurt you but would surprise you I am sure.

Double nests of birds are quite rare and the illustration herewith of a double nest of the chipping sparrow is a fine example of nest building. The nest is undoubtedly the work of one pair of birds as the horse-hair used in forming both the "cups" is twined around the two in the form of a figure eight. In addition to this there were only four eggs (the usual number of eggs of this species) in the two cups. Why the birds went to all this additional trouble will never be known.

Not long since my attention was called to a book on photographing birds and their nests in which it was recommended that the branch on which the nest rested should be cut down and transferred to a more advantageous position so it could be easily photographed. I hope this method

DOUBLE NEST CHIPPING SPARROW. W. H. Fisher.

will not be pursued by naturalists as changing the position of a nest will oft-times make the old birds leave no matter how carefully it is done. In the various states throughout the Union laws are being passed for the protection of our birds and it will be a great mistake to permit moving nests as this will kill off the birds, if the method becomes popular, quicker than if they were shot down by gunners.

A STREET BY NIGHT. Cleo S. Bourgeois.

A NOVEMBER FOG. Frank E. Marks.

ACETYLENE LIGHTS.

By GEORGE RETTIG.

W. H. Porterfield.

IT occurring to me that some of the readers of the Annual might be interested in knowing how I connect the lights with the gas generator, described on page 233 of the 1903 Annual, I send you the following sketches and descriptions.

For supporting the lights I fasten a stick in a box or block, to hold it in an upright position.

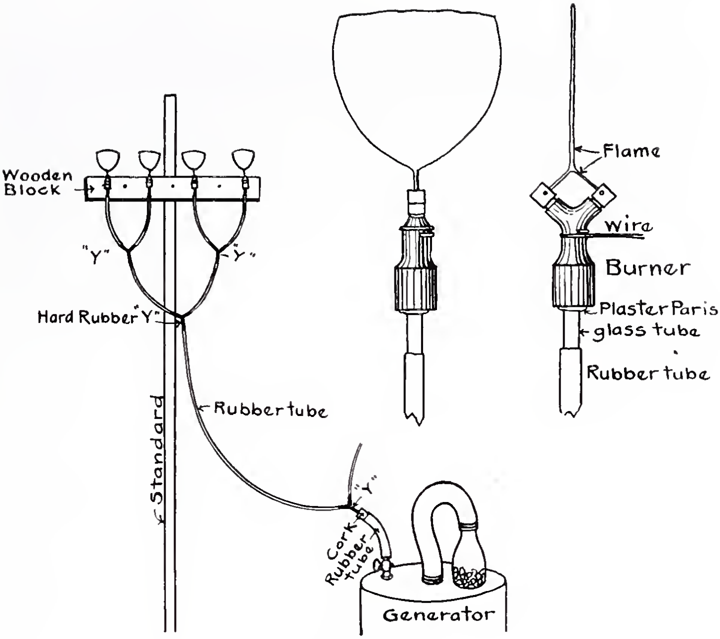
On this standard is fastened a wooden block with small holes bored into it to receive the wires which are twisted around the burners. This block is arranged to fasten at any desired height on the standard.

The burners are made especially for acetylene gas and may be procured through any dealer in gas fixtures. Ordinary gas tips will not do.

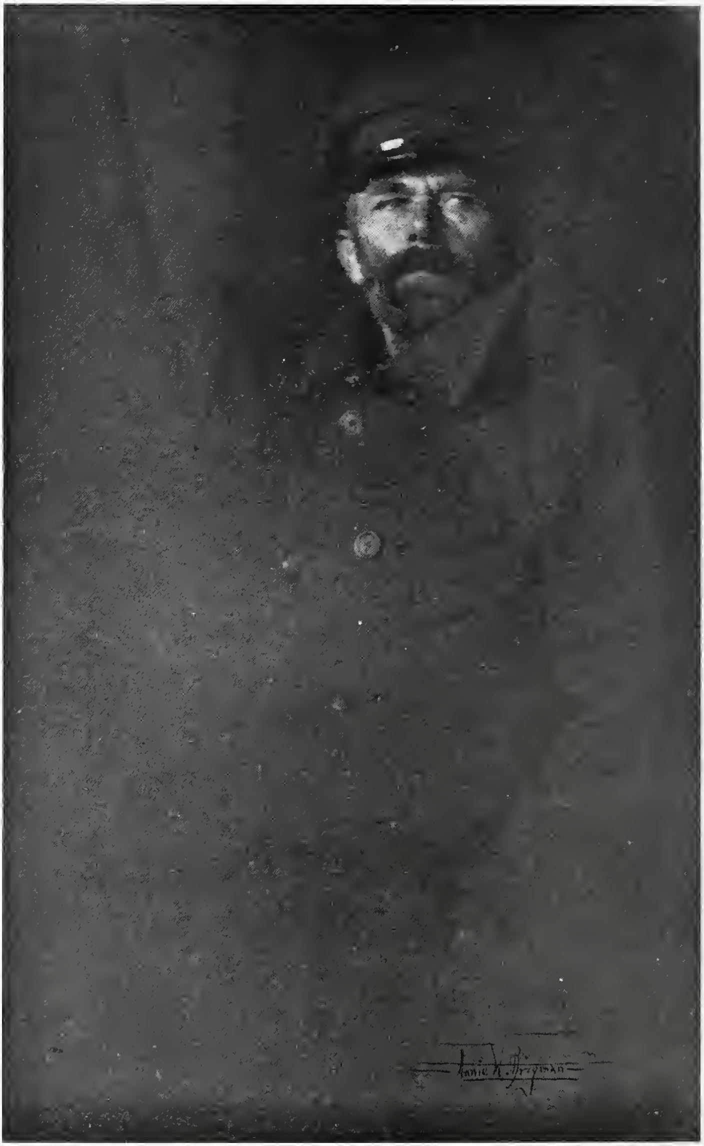
A glass tube is fastened into the burner with Plaster of Paris. After filing the sharp edges off the glass, rubber tubing is slipped over the end and connected as shown in the sketch, with hard rubber "Y" connections, which may be bought at a phonograph store.

To connect the small tubing with a large rubber tube leading from the generator, I insert one of the "Y's" through a cork which fits into the rubber tube.

Any lights which are not needed may be cut off by closing the tubes with photo clips.



ACETYLENE LIGHTS.



PORTRAIT. Annie W. Brigman.

ORTHOCHROMATIC NON-HALATION PLATES AND LIGHT FILTERS VERSUS ORDINARY PLATES.

By W. H. WALMSLEY.

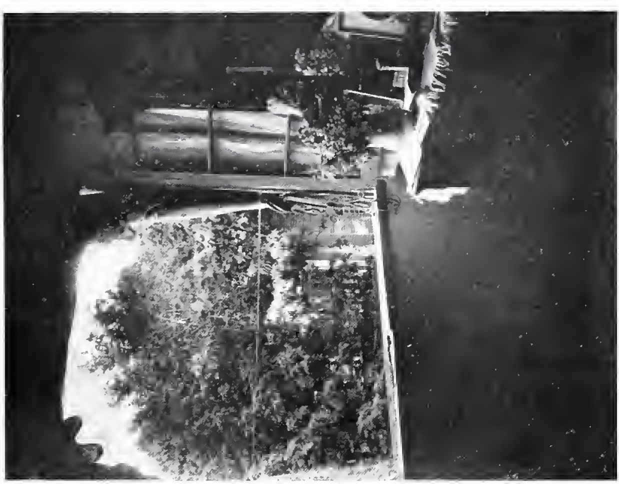
W. von Gloeden.

NOT a little singular, in view of the universally conceded value of orthochromatic or color-correct plates in almost every department of photography is the fact that their use is still very limited in this country by professionals and amateurs alike, but a small percentage of the vast consumption of plates being of this class. In certain professional work requiring the correct rendering of color values (in the absence of the colors themselves) they are almost exclusively employed, and many amateurs who really are true workers, sparing no pains to reach the best obtainable results, are also using them. But the great army of "push-the-buttoners," and most of the professional portrait photographers, know really nothing of their proper use or value. Were they so acquainted and fully impressed with the capabilities of such plates for producing results not possible to those of ordinary make, we should speedily see a vast change in their work. Lovely, soft, harmonious draperies would supplant the hideous harshness now so common in the out-turnings of the portrait gallery. The chalky, meaningless spaces, supposed to be skies in landscapes, would give place to soft and fleecy, dark and lowering, or storm-swept clouds harmonizing with the view as actually taken, and not *printed-in* from cloud negatives, too frequently quite unsuited to the composition or subject.

In like manner extensive and general use of non-halation plates seems to be even more neglected. Certain subjects imperatively requiring their employment meet with a reluctant eoncession to this demand, but in myriads of exposures wherein they would largely add to the quality and perfection of negative and print, they are persistently neglected. Why is this? Doubtless many answers to this question might be made, but two or three which seem to fairly cover the ground will suffice. Backed plates, either as furnished by the makers (at an additional price), or backed by the operator himself, by coating with caramel or similar preparations, are most effectually non-halation, there is no doubt about that. But all the operations connected with their use are dirty, messy and disagreeable. Most American amateurs object to them on this account, and they have never come into general use in this country. Double-coated plates (originally introduced in England) may now be had from leading American makers, and they answer the desired purpose most admirably. But their cost being much in excess of ordinary plates—already too great—and the uncertainty attending their development, would seem to prevent their general introduction. Whatever the cause however, the fact remains that the great majority of real amateur workers use them very sparingly, if at all. Thus, in addition to the neglect of color correct and non-halation plates with judiciously chosen screens or ray-filters, a vast number of photographs fall short of the perfection they might reach were these important aids to their making employed. With hopes of stimulating my amateur friends, who may chance to read them, into making efforts in these directions for themselves, the following brief notes of my own working methods have been written for THE ANNUAL:

Although most, if not all, of our American makers furnish orthochromatic plates, and of excellent quality, it must be admitted that both English and Continental manufacturers are far ahead of them in some important particulars. The latter supply plates sensitized for all the rays of the spectrum, whilst, so far as I am aware, American plates are rendered extremely sensitive to yellows only. Should one require a plate particularly adapted to any other color, he must prepare it for himself. To be sure, a careful worker

THE ROUND TABLE. Clarence H. White.



may do this by bathing an ordinary plate in a proper staining solution, formulæ for which are now readily obtainable, but doubtless most of us would prefer to purchase them all ready for use. Cramer's "Isochromatic" plates are treated with the coloring material in the emulsion, but nearly if not quite all other American makes are orthochromatized by bathing. It is claimed, and I believe justly, that the slow isochromatics of this brand give excellent color values without the use of screens or ray-filters, but such is not the case to any marked extent with the bathed orthochromatics. Color screens are necessary adjuncts to color correct plates, and it may be that this fact has been a factor in preventing their more general adoption. The prevailing idea would seem to be that liquid ray-filters and optically-worked colored glasses are alone suitable for practical work, and if these are not employed that sharp focusing or distinct images are impossible. Theoretically this may be true, but practically it is not. If a thin plate of unworked glass be introduced between the two systems of a rectilinear lens in place of the usual diaphragm, it will undoubtedly produce a more or less blurred image. But if it is mounted in front of the lens, no such effect will be apparent.

No adverse criticism, of course, can be offered as to the perfect workings of a liquid ray-filter or one of colored optical glass. In performance either is probably almost perfect. But their considerable first cost, coupled with the chances of leakage in the one and breakage in both, are potent factors in limiting their sale or use, and consequently diminishing the employment of orthochromatic plates in a like degree. If, then, it be demonstrated that any one can make his own screens which will serve all practical purposes at a very trifling expense of time and money, may we not hope that very many who have not used orthochromatic plates in the past may be induced to adopt them, and thus raise the standard of their work in future?

For a number of years my own photographic work has been almost wholly confined to photo-micrography, which requires, it is needless to say, the utmost perfection in focusing and resolution of the details of subject. My apparatus —the property of The Pepper Clinical Laboratory of the University of Pennsylvania—is of the latest and best productions of the world-famous Zeiss establishment at Jena, using the electric arc as radiant. Among the various pieces comprising the optical bench are two cells of carefully-worked glass for holding colored solutions as ray-filters. Nothing could fill the requirement better, but to break one is costly and the continual spilling of the contents upon the apparatus, provoking and disagreeable. In consequence, after careful and exhaustive tests and comparisons with screens of my own make, the performance of the latter was found to be so uniform, excellent and reliable, that the liquid cells were entirely discarded—all my work for the past two years having been done with unworked glass screens alone. Three or four shades of yellow, from pale lemon to deep chrome; as many of orange tints in about the same gradation, and a number of greens, including one of flashed "signal green," comprise about all that will be needed for landscape and the ordinary classes of work. For photo-micrography, several red tints, with one of deep violet, will be found necessary. These were all made in a single morning's work, as follows:

Carefully selected lantern-slide plates, after being fixed in hypo without exposure to light, were thoroughly washed to eliminate all traces of that useful but treacherous salt. A thin colorless film of gelatine was thus left upon each plate in suitable condition to take the various dyes. These were, for the yellows, picric acid and naphthol yellow. The orange tints were obtained from aurantia by varying the time of immersion or strength of the solution in a slight degree. Acid, methyl and malachite greens gave the necessary varieties of that color in blueish tints; the addition of a small quantity of picric acid to the acid green affording a beautiful grass green dye. Two per cent. solutions of each were used in hard rubber trays that were kept in constant motion to insure even staining of the gelatine films. The required depth of color being reached, the plate was lifted from the tray, lightly washed with filtered water, and laid flat upon a level surface to dry spontaneously, care being taken to keep it free from dust during that time. The finishing was effected by covering the slide with a carefully selected lantern plate cover-glass free from striae or other imperfections, and binding the edges as usual with a strip of gummed paper.

For use, a light wood frame may be made to carry the color screen attached to front of lens-hood, or any other method that seemeth good to the user. The screen having been provided, some means of utilizing it will doubtless be found. In my own case, with a Thornton–Pickard roller-blind shutter in front of the lens, a couple of grooved slides on its front, carry the screen, which may be inserted or withdrawn in a moment. In my photo-micrographic work the screens are carried by the saddle and stand, furnished for the liquid cells with the optical bench.

Of the entire and perfect efficiency of these home-made color screens there can be no reasonable doubt. I have made many hundred exposures with their aid in every description of work without a failure, and can truly say that they leave nothing to be desired. Writing, as I am, in the heart of West Virginia's mountains, removed from all access to negatives or prints at home, I can only offer as illustrations of their capabilities a few prints from negatives just made by their aid, in which the soft clouds of a brilliantly-lit June sky are shown in pleasing contrast to the empty, chalk-like spaces in prints of the same subject from plates exposed almost simultaneously, but without color screens. And I doubt if the most costly and elaborately worked ray-filter would have done any better. I do not decry the use of the best and most costly apparatus for all purposes if one can afford it, but I do contend that there is no use in denying oneself all of the advantages offered by orthochromatic photography through fear of extra cost or trouble with color screens.

And the same assertion holds good in regard to the absolute avoidance of halation under any and all circumstances. It is not necessary to incur the cost of double-coated plates, nor the annoyance and dirt attendant upon the removal of the ordinary caramel or similar backings from others. All plates may be backed and rendered proof against halation under the most difficult conditions in a few moments by any one The backing may be removed in another moment and used over and over again until worn out. And what is this backing? Only a simple piece of dead black paper in optical contact with the back of plate. And how is this effected? Quite easily and in a simple manner, although it took me some years to attain to it, and then quite accidentally, whilst hovering all the while in a more or less unsatisfactory manner around the borders, as it were, of the true method. Recognizing the almost vital importance of non-halation plates in photo-micrography at an early stage of my work, and dissatisfied with the usual backings, I sought a substitute which might be readily applied or removed and satisfactory for the purpose. This was found in a sheet of black paper of the kind some makes of plates and printing papers are wrapped in, which being soaked in water, the excess drained off and squeegeed to the back of the plate, most effectually reduces halation to the vanishing point. The one objection to this process was the speedy drying of the paper, causing it to leave the plate and of course destroying its light-absorbing quality. For this reason it was quite useless in landscape or any other work requiring plates to be kept in the holders for many minutes after being thus backed. In photo-micrography, however, as this could be done at the last moment prior to the brief exposures, it proved to be quite efficient and satisfactory during several years of work. Then came the long-sought solution of the problem, so simple and yet so perfect as to leave me amazed at my stupidity in not finding it for myself. In a number of *The British Journal Almanac*—year forgotten—I stumbled upon a short article from the Orient, in which the writer stated that black paper coated with glycerine had proved to be, in his hands, a most excellent backing for plates. To read was to try for oneself; the result, perfection! Nothing could more absolutely eliminate every trace of halation; nothing could be more easily applied or removed; nothing could be cleaner; and plates thus treated will retain their non-halation qualities for a very considerable length of time, a necessary feature in field work. I have kept them in holders for more than three weeks without drying or loss of non-halation properties. The method I adopted for applying the backing, simple but effective, is as follows:

A piece of black paper, slightly smaller than the plate, is dampened with a sponge (on being used for the first time) and laid upon a sheet of glass or smooth clean board and a small quantity of glycerine poured over it. Then, with the fingers, this is to be smoothed and evenly spread to cover the paper all over to and beyond its edges. Use plenty of glycerine,

but any excess is to be avoided. To this point all procedures may be effected with a bright light in the dark room, but the subsequent ones must, of course, be under a ruby light. Taking a plate from the box, lay it face downward on some clean surface, covering the back with the glycerine-coated paper, which must be made to lie flat without wrinkles. Then wipe this off gently with a slightly moist sponge, and, placing on it a soft towel or cotton cloth, pass a rubber squeegee over it several times, which will cause the paper to adhere to the glass quite firmly in perfect optical contact. When ready for development the paper may be peeled from the plate, by raising one corner and pulling gently, laying it upon some clean surface in readiness for further use. The back of the plate should then be wiped with a moist sponge and the development proceeded with as usual. No further moistening of the paper with water will be needed, merely put a little additional glycerine over the surface every time it is used again.

The accompanying illustrations are all from negatives made with Forbes' Orthochromatic Plates, bathed and extremely sensitive to yellow rays. The keeping qualities of these plates are remarkable. Nos. 1 to 6 had been sensitized about six months, whilst No. 7 was nearly two years old at time of exposure, yet there was no perceptible deterioration in it. And last winter I found a box of undeveloped plates which had been exposed two summers previously in these mountains and accidentally overlooked. I did not expect much if anything from them, but was most agreeably surprised on their turning out quite equal to freshly exposed plates This is a very valuable feature in bathed or dyed plates, which does not seem to be shared by those in which the orthochromatizing is done in the emulsion.

In these mountains there is rarely if ever a day during the entire summer in which the brilliantly blue sky is not flecked with soft, fleecy white cloudlets, like unto the down upon the breast of a swan, which reflect the light from the sun with the utmost intensity. A landscape view taken at such a time on an ordinary plate without backing, presents a colorless, vacant space in place of the lovely cloud-bedecked sky as seen by the eye; and is shown in Fig. 1. It will be noticed also that the distant range of mountains is quite in-

LEONORA Dr. F. Detlefsen.

distinct, owing to the absence of any backing to the plate and the extreme brilliancy of a noonday June sun. Quickly as the holder could be reversed a second exposure was made on a plate backed with the glycerine-coated paper and behind a screen of aurantia-dyed film. The result and contrast with No. 1 are shown in Fig. 2. The soft clouds are beautifully depicted, and the mountain range is distinctly defined though bathed in blinding sunshine. No. 2 was given three times the exposure of No. 1, but all other particulars

of plates, diaphragms and lighting were exactly identical. The same remarks may be made as to Figs. 3 and 4, excepting that the clouds were slightly heavier than those in the previous example, and the screen was dyed with picric acid in making Fig. 4, the plate of which was backed as in Fig. 2.

The avoidance of halation by a backed plate is rather strikingly shown in Fig. 5, a most uninteresting subject, but the best I could do under the circumstances. It is a view taken within my room in the rambling old hotel through the large French window, open to its full extent upon the scene without under the blazing light of a noonday sun. A chestnut tree in full bloom, with the deep foliage of a pine and the corner of a white cottage—all about two hundred feet distant—with a glimpse of bright blue sky overhead comprise the view. A Forbes' orthochromatic plate, backed with glycerinated paper, gave a clear-cut picture without halation, the tree tops being distinctly defined upon the background of brilliantly-lighted sky. Fig. 6 presents the same scene, made with the other plate in same holder—not backed—and tells its own story better than words could do. No color screen was used with either, and in all particulars plates, diaphragms, time of exposure and development, the procedures with each were precisely alike. The backing of plate for Fig. 5 was the only difference, and, as will be seen, it made a vast one. I would ask, could any other form or method of backing or any costly double-coated plate have done better with the subject than this simple paper-backed plate has accomplished?

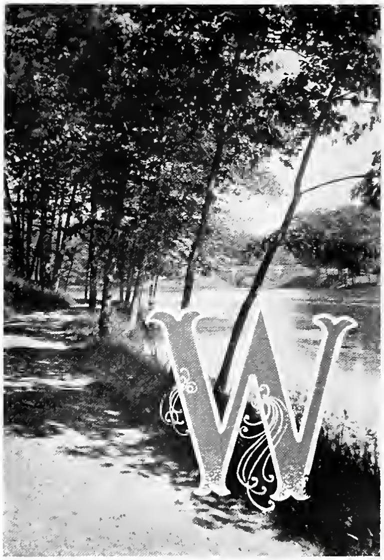
The paper backing is equally efficacious in eliminating halation around the windows of a room when making an interior view. Every one is familiar with the effect produced when this is attempted with an unbacked plate. Having no means of making a special example of such work here, I am offering in Fig. 7 a print from a negative made last year of the photo-micrographic apparatus, of which mention has been made. It was impossible to do this without at least one window being included in the view, and the results with ordinary plates were disastrous. Finally, one backed with the glycerine-coated paper was used with the perfect result shown by the picture. Not a particle of halation under three minutes' of exposure on a clear sunny day. Unfortunately, the print is an imperfect one, but as it is all I can get now, must go as it is and speak for itself.

PROLETARIAT. A. S. GOSS.

REMBRANDT STUDY. C. T. Wernwag.

MAY BLOSSOMS.

By JOHN BOYD.



WATERSIDE. Albert S. Hall.

WHEN nature is at her loveliest is in May, the month that divides the parting Spring from the coming Summer. In her motherly kindness nature is spreading her great umbrageous leaves over the now green earth, to which the passing April has given its sweet and beneficient inspiration. The orchards are the beauty spots to which our eyes wander, as their pinky blossoms fling their fragrance to the breezes—all too soon to pass away. Not entirely are they lost, for we can preserve their symmetrical outlines and dainty curves in all their harmonious assembling by the camera's aid. The peach, the pear, the cherry, the plum, the crab apple, and the apple are all subjects for the lens and plate, and lucky is he who can nearest approach perfection by our monochromatic process. How we long for that coming millennium of the photographer, when we shall be able to impress on the plate the beauty we see with our eyes.

To picture the entire trees would be our first thought, but the rudimentary principles of the art tell us that pink or white blossoms against a blue sky will not produce a satisfactory result neither will a background of clouds bring out the beauty that is nestled in amongst the green leaves quivering between earth and heaven. I have tried it both ways with all the precautions that experience could suggest, but there was a "something" that kept the result from giving me satisfaction. To view say a crab-apple tree in full bloom by night brings up the wish to picture it at that time, but the long exposure and the difficulty of lighting it

PEACH BLOSSOMS.

properly are stumbling blocks that will needs be overcome before success can be ours, but I throw out the hint to the enthusiast in this line who has a battery of large flash lamps, to give the subject a trial. It seems to me it would be well worth any amount of effort.

Seeing that we have difficulty in picturing the whole tree, we must get down to humbler proportions, but with not a whit less of beauty. A small sprig carefully selected

PEAR BLOSSOMS.

that has blossoms in various stages of advancement will give us material for future study, as well as bringing out our artistic capabilities. I incline to natural backgrounds, and there is none handier than a close cut lawn, when brought into conjunction with a sharply focussed object of any kind. To be effective, the grass must be well out of focus, and if the hints that follow are adhered to, you will have a receding background that will allow the principal object to stand out in all its beauty, and yet not appear manufactured in any way.

Take a stake an inch or so in thickness, and a couple of feet in length; cut a notch in the top sufficiently deep to allow the branch we are going to picture to be inserted, and drive it into the ground on an angle of 45 degrees. In selecting the location, arrange it so that the light will strike on the flowers at nearly right angles to the lens—the best time for soft results is within an hour of sundown with the camera facing to the north. You must also see that the grass just back of your stake is evenly cut, has no bare spots, and no extraneous objects within the field of view, otherwise it will be blotchy.

Now place the branch to be pictured in the notch, and set up your camera, inclining it sufficiently to take in what is needed. Look again at your branch, and if necessary move it until it is on the same angle as the camera. This is necessary to get it on a plane with your lens, and thus aid the swing back in obtaining an even focus. Do this very carefully, and when the image is at its sharpest all over the ground glass, with the lens wide open, it is time to stop it down to F. 11, or at most F. 16. If you reduce the the aperture more, you will bring the background into prominence, and this is what ought to be avoided. We will assume that you have orthochromatic plates of a non-halation brand, or at any rate the first kind with a backing applied by yourself, and are ready to open the shutter. If the hour is 6 p.m., stop F. 11 plate, Cramer Inst. Iso., sun shining brightly, but now below the nearby tree tops; the exposure will be about three seconds.

The developer should not be strong, but much diluted with a liberal proportion of water, so as to bring the image up slowly, subsequently pyro or alkali as may be found necessary when building up the negative to its proper printing strength. The finished print, if made on Platinotype, will give a result that leaves nothing to be desired, for besides being a thing of beauty, it will prove a joy forever.

THE CALF PATH. A. S. Goss.

A FLASH LIGHT HELP.

By C. M. WHITNEY.


O. C. Conkling.

I SUPPOSE that nearly every amateur who passes beyond the "Press the Button" stage, comes in time to have some specialty in which he is particularly interested.

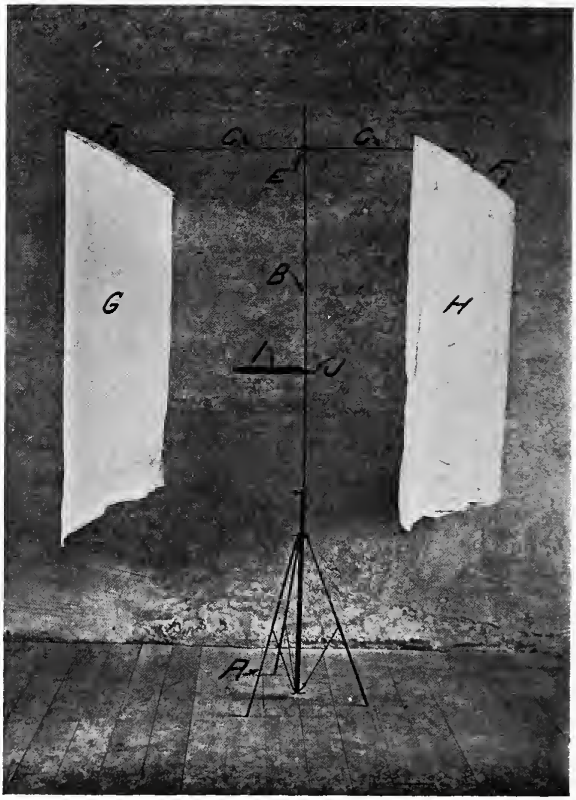
In my own case I have come to consider portraiture by flash-light as the most attractive branch of the art, and as a consequence I have spent some time and thought in perfecting a satisfactory equipment for this class of work.

One of the most useful and important articles in my outfit is the lamp stand and screen holder of which a description is herewith given, in the hope that it may prove useful to some of my fellow amateurs. It is the outcome of a series of experiments with a variety of contrivances, and while it is no doubt capable of being improved, it has proved very satisfactory in its present form.

Referring to the illustration—the base A of the stand is the bottom of a cheap music rack, such as is used by musicians. The upright B is a piece of $\frac{1}{4}$-inch iron rod, about 7 feet long. This rod could be made more compact for transportation by making it in two parts, with a screwed joint in the centre, but this would entail considerable extra work, which would hardly be warranted unless the stand were to be carried about a great deal. On this upright rod slides a small annular brass casting, E.

The arms C C made of $\frac{1}{8}$-inch iron wire, are topped into bosses on opposite sides of this casting, while a third boss is topped for a small thumb screw, which serves to hold the arms at any desired height.

These arms are each about 2 feet long, and the outer end of each is bent into a hook. On these hooks are hung the reflector G and the screen H. The reflector is a piece



of white sheeting, about a yard square. The screen or diffuser consists of a double thickness of white cheese cloth of the same dimensions as the reflector. These are sewn on one edge to 3 feet lengths of ⅛ inch iron wire F F, which have at the middle point a small wire loop by which they are hung on the cross arms.

I is the bracket on which the flash lamp or cartridge is placed. It is made up of a piece of sheet iron about 8 inches square. This is riveted to the arms of a Y shaped brass casting, the stem of which projects beyond the edge of the plate and is thickened up enough so that a ¼-inch hole can be drilled through it for the rod B. A small thumb screw J holds it in any position.

The use of this stand needs very little explanation. The sitter being placed in the desired position, a candle may be placed on the bracket I and the proper position for the stand determined.

For a seated figure this will usually be about 7 or 8 feet high, and well in front of the subject. The arms C C should be raised so as to bring the centre of the screen and reflector somewhat above the bracket as most of the light from the burning magnesium is given off at least a foot above the bracket.

A little practice with this device will show one how best to use it, and in case one has occasion to use flashlight to any extent it will be found a very useful artice to have in one's outfit.

In closing I would suggest that before using this device both reflector and screen be dampened, as by so doing all danger of their igniting from the flash is avoided.

EVENING — Wm. Lean.

MISS DOROTHY HAMMOND AS PORTIA. Rudolf Eickemeyer, Jr.

PHOTOGRAPHING IN EGYPT.

By DAVID GRAY ARCHIBALD.

PORTRAIT. Cleo S. Bourgeois.

HAVING had the pleasure of photographing in Egypt along the Nile from Alexandria to Wady Halfa at the Second Cataract, a statement of what I learned that one may expect while doing so might interest your readers contemplating making the trip.

It should be remembered that Egypt has but two large cities, Cairo and Alexandria, and for the most part consists of a narrow strip of fertile land along the Nile River, in width never exceeding ten miles and in some places hardly that many feet. On the Nile there are a few large towns, among them Assiout, Luxor, and Assouan, where photographic supplies of a certain limited kind may be obtained. These towns include a few hotels and shops for tourists and the inevitable Bazar, or native market. The Bazars of Cairo exceed all others in extent and their population is fully as interesting as elsewhere. So the Bazars in these towns may be very briefly visited, for what little you miss in them will be found in the greater city, Cairo. The temples and monuments are the great attraction along the Nile.

The native guide is indispensable, cheap, and remarkable to state, very useful. With his aid and the generous use of carriages in the cities and donkeys in the country, (the hire of which is very reasonable), you can move around easily and quickly.

Landing at Alexandria, the Khedive's Palace, the Tomb of the Fisherman Prophet, "Rotten Row" (where ships in debt are held after having their rudders taken out), the Careening Basin, and perhaps the lighthouse and old forts are all there is to take in the harbor. Parts of the city showing the effect of the bombardment are of interest. Pompey's Pillar should not be missed. The Arab fleet at the Nile is picturesque. Many parts of the native quarter will interest you. High noon is the proper time for photographing there, for you cannot (?) take time exposures since the people will not keep still. Your "boy," or guide, will do his best to help you get views of the people and places, and a little "Becksheash" here as elsewhere in the Orient will smooth feelings and improve manners.

Going from Alexandria to Cairo, which takes about three hours by train, you pass through the garden spot of Egypt, the Delta of the Nile. Cairo is the most interesting place in Egypt to photograph in, for its attractions are many, its Bazars are of the finest and in its life it is the most curious mingling of Orient and Occident. In and around the city you will find plenty of subjects, such as the Citadel, the Mosques, the Tombs of the Kalifs and Mamaluks, the City of the Dead, the city itself from the desert and Citadel, the Barracks of the Army of the Occupation, the great Nile bridge, the public gardens and squares, etc., etc.

The Sphinx and Pyramids are near at hand. They should be visited in the morning for then the light is right for taking them. A modern trolley leaves the west end of the Nile bridge for the Pyramids hourly on the even hour. The trip takes about forty-five minutes and costs fifteen cents each way, first class. Arriving at the end of the trip, at the Mena station, you will be almost carried off your feet by the Arabs unless you have wisely brought along a dragoman (i. e.—guide and interpreter). In fact, you had better have one for your entire stay in the city, leaving it to him to take you about to the various places you wish to go. These men charge all kinds of fees, for in this as in everything else there is no fixed price. Cook's office will get them for you, also the hotels. If you hire one independently, according to how good a judge of men you are and how good a bargain you can drive, will depend how much you will enjoy your sightseeing and how much your expenses will be.

As to supplies. In most parts of Egypt you can obtain films, but plates (except ¼ plates) are not so easy to get, and when you do get them, you will find they are usually of French manufacture and size. The prices are from 25 to 50 per cent. higher than for the same in America. The climate is hot and the water sandy, so the numerous persons engaged in developing and printing for amateurs slight the washing, etc. It is far better, if you can content yourself, to wait until you get home before having work finished.

The Nile trip is made in express and tourist steamers and in private Dahabeahs. The private Dahabeah upon which I traveled, the "Serapis," was said to have a complete dark-room on board, but it proved to be little else than a convenient place to change plates and store apparatus. Excepting at Alexandria and Cairo and in the Delta they have practically no rain, so you are always sure of clear skies. The light in the winter months (the tourist season) is good but not so intensely so as one would expect, for Egypt is not so far south as we are inclined to think. The days are warm and the nights cold and the air intensely dry which tends to affect the wood-work of your camera, which should therefore be a well-seasoned one.

At most places you ride about on donkeys and you will have a porter to carry your camera for you. The wise man does not allow this porter and his burden out of his sight. Have a stout handy tripod along, also a flash lamp for interiors and a receptacle for carrying plate holders, light, strong and fairly light tight. A changing-bag is very handy and saves worry should you be unable to find a suitable place to change plates in. It is a dusty country, so keep your camera and plate holders as well protected as possible. I always keep my holders full of fresh plates, for you never can tell when you will want to expose all the plates you possibly can. I change plates each night, even if I have access to a dark room and repack the exposed plates in the original packages. In these I find they travel very well.

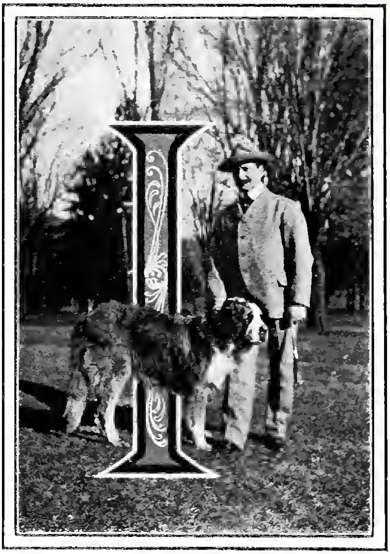
MISS M. J. H. Field.

INNOCENCE. Oscar Maurer.

CURIOSITY. Richard Trotter Jeffcott.

GOOD FRIENDS.

By CHARLES M. TAYLOR, Jr.



C. M. Taylor, Jr.

I HAVE found the best friends to be, outside of the human family, a noble horse, a faithful dog and a good camera. When the first mentioned happens from any cause to be out of sorts you always have your dear camera to back you, no matter how much you may have abused or scolded it. It is always *cheerful* and *willing* to work for you twenty hours out of the twenty-four that is in each day, and should you insist, it will only be too glad to throw in the remaining four hours without even a word of complaint.

When the tourist, that is, the "*up-to-date*" traveler, goes on a trip, he never forgets his camera, though he may quite easily overlook to provide enough money in his pocket-book. Then why not claim the camera as your best friend ?

I have many times heard the ignorant amateur condemn and scold his innocent and willing little camera; place all sorts of blame upon its workings, its transient moods; and although in the *camera's heart* it well knows that all said condemnatory is a gross libel on its good name and reputation, keeps silent, strictly adhering to the golden rule, "Saw wood and say nothing."

In my opinion there is no more useful friend, nor one that will give the lasting pleasures than that of the camera. It not only recalls pleasant memories of your camp in the woods, or your frolics at the seashore, but will lend its aid to science and the arts.

Again, it is the "go between," so to speak, when the young and shy stranger seeks your acquaintanceship at the time when you are far from home.

I well remember, whilst en route from London to Paris, that my little camera was the means of introducing me, and in a proper way, to an English family composed of father and his charming daughters. Arriving at Calais, one of these daughters said aloud and addressing the father, "Oh! if that gentleman (alluding to me) would only take our pictures in a group as we sit in this car—how perfectly lovely — we could send them to our friends at home." I accepted the indirect invitation—the camera did the part of a mutual friend, and performed it so well that I not only had the pleasure of their companionship but their friendship as well for years afterward.

At times the camera seems almost human and willing to perform its share when one has trouble thrust upon him. For instance, when photographing in Japan and upon the sacred ground at Nikko, where a permit was strictly required—having no license and unable to secure one—I went to work snapping scene after scene, much to the fear of my guide who stood nearby, scared white. At last I was arrested for my "*American boldness.*" Then it was that my little camera seemed to shrink or wither up to so insignificant a thing as to be placed in my pocket. The tripod was folded into a walking stick, and as I walked by the side of the officer and guide, presumably to the "station house," I halted and said to the officer, "It is foolish to arrest me for theft or a misdemeanor, for I am carrying off naught nor have I done harm to any one." To the officer my statement really looked reasonable and with courteous apology, after a few coins had been *adroitly* dropped into his hand, I was allowed to go my way. Now suppose it had been a "bushel of apples" I had taken, what would have been my fate?

How could the artist, the draughtsman, the manufacturer, the scientist, reduce his labors to an equal degree without the aid of our "good friend," the "camera." It has also made many important discoveries by its penetrating and ever vigilant eye (the lens), and as the progress of man's ambitions advance, I'm sure the "camera" will keep abreast of the times, not only by giving pleasure to the masses, but knowledge and usefulness to "Science and the Arts."

THE ARTIST. Gertrude Käsebier.

PORTRAIT. The Misses Selby.

BOOK-COVER PHOTOGRAPHY.

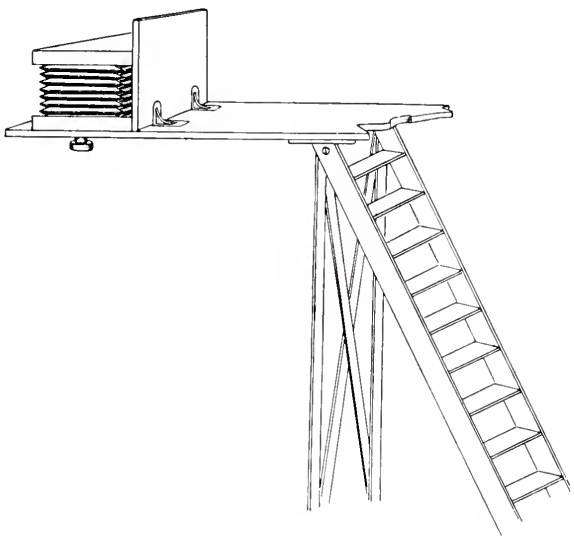
By ROBERT E. M. BAIN.

D. Rosser.

MAJORITY of cover designs for modern books consist of objects animate and inanimate, posed in various positions and surrounded by scroll or framework of a suitable character. It is comparatively easy to draw the scroll design or frame-in the picture proper, but the chief figure is usually effective only in the hands of a capable artist in pencil work. While to most of those in the trade the use of photography in designing is well known, there are many who seek to originate designs who know not this means and are not sufficiently expert with the pencil to master the work by another method.

In laying out the design the general idea should be fully fixed in the mind, and, save in the matter of detail, the picture decided upon should be adhered to until finality. This with a view of keeping all parts in harmony. The general plan composed, the treatment of the page as a whole should be sketched in roughly and the placing of the figure work arranged for. Then follows the carefully thought out idea of what the figure work is to represent, to be followed by its posing, and transfer to the sensitive plate in the camera and after proofing on some developed paper, its being placed in the allotted space and a contemplation of the tout ensemble with a view to harmonizing the entire work.

What concerns this article is the photographic portion, or reproduction of the posed figure in negative form. Most useful for this work is the floor of a well-lighted lumber room or attic, or barn floor. The background may consist of a floor covering of some neutral color; a bright or white ground should be avoided. It is not advisable to tack this



down, as it is not always to be used as a "flat" but frequently as drapery. To avoid the use of a very wide angle lens the ceiling should be high. If a room suitable for this work is not to be had the work can be accomplished equally well, in fair weather, out of doors in a shaded portion of the yard, the north side of the house preferred. If it is desired that the figure be posed against the background no special accessories are required and the "ground" in that case should not be painted in the form of a landscape or "seascape" as the case may be. If distance is to be represented a pair of carpenter's horses will be required and a board on which to pose the figure or figures. The camera is then mounted near the ceiling on a board at right angle, held in position by means of small iron brackets. If used within doors this may be swung to hooks in the ceiling or attached, as per illustration, to a stepladder, care being taken to extend in the latter case so that the "field" may not include the ladder. If the work be done out of doors the board can be extended from a window when properly steadied and braced. The focusing once done it will be unnecessary to repeat it and the plate holder can be inserted and shutter set from the ladder or window. In the latter case the camera may be so mounted that it will slide to where the shutter and plate holder may be easily reached, and then pushed into position.

In posing for "flat" work the subject should, after properly draping, be stretched out on the ground and, if a human figure, the drapery and hair can then be spread out to represent the action of flying, running or similar movements, or the lifting of great weights; or various athletic exercises can be shown without fatigue to the object, as the exertion is simulated and can be maintained indefinitely. This manner of posing is specially applicable to flying subjects, balloon-basket figures, angels and other features of this character.

When the subject is to be represented as apart from the "ground," it is posed on the trestles, the drapery concealing the framework and by this means an effect of distance can be easily maintained and the most unique poses sustained indefinitely. These hints should offer suggestions to those interested in this class of work and without further explanation place them in the way of developing new fields in this interesting branch of photography.

H. A. Hess.

Practical Formulae for Plates, Papers, etc.

HAMMER PLATES.

Pyro and Soda Developer.

No. 1.

Metric weights and measures.		English weights and measures.
900 c. cm.	Pure water	30 oz.
150 grms.	Sulphite soda crystals	5 oz.
75 grms.	Carbonate soda crystals	2½ oz.

No. 2.

720 c. cm.	Pure water	24 oz.
1 grm.	Oxalic acid	15 gr.
30 grms.	Pyrogallic acid	1 oz.

To develop take of

30 c. cm.	Solution No. 1	1 oz.
15 c. cm.	Solution No. 2	½ oz.
30 to 180 c. cm.	Pure water	4 to 8 oz.

More water may be used in warm weather and less in cool weather.

If Solution No. 1 is made by hydrometer test, use equal parts of the following:

Sulphite soda testing	80 deg.
Carbonate soda testing	40 deg.

One ounce of this mixture will be equivalent to 1 ounce of solution No. 1.

Pyro and Potassium Developer. No. 1.

960 c. cm.	Pure water	32 oz.
240 grms.	Sulphite soda crystals	8 oz
30 grms.	Carbonate potassium, dry	1 oz.

No. 2.

720 c. cm.	Pure water	24 oz.
1 grm.	Oxalic acid	15 grns.
30 grms.	Pyrogallic acid	1 oz.

To develop take of

30 c. cm.	Solution No. 1	1 oz.
15 c. cm.	Solution No. 2.	½ oz.
90 to 180 c. cm.	Pure water	3 oz.

When the plate is fully developed, if the high lights are too thin, use less water in the developer; if too dense, use more water.

Pyro and Metol Developer. Good for Short Exposures.

No. 1.

1710 c. cm.	Pure water	57 oz.
75 grms.	Sulphite soda crystals	2½ oz.
30 grms.	Metol	1 oz.

No. 2.

1710 c. cm.	Pure water	57 oz.
75 grms.	Sulphite soda crystals	2½ oz.
8 grms.	Pyrogallic acid	¼ oz.

No. 3.

1710 c. cm.	Pure water	57 oz.
75 grms.	Carbonate potassium	2½ oz.

To develop take of

90 c. cm.	Pure water	3 oz.
30 c. cm.	Solution No. 1	1 oz.
30 c. cm.	Solution No. 2	1 oz.
30 c. cm.	Solution No. 3	1 oz.

This developer may be used repeatedly by adding a little fresh developer as required.

Keep the used developer in separate bottle.

Metol and Hydrochinon Developer.

No. 1.

2400 c. cm.	Pure hot water	80 oz.
30 grms.	Metol	1 oz.
4 grms.	Hydrochinon	⅛ oz.
180 grms.	Sulphite soda crystals	6 oz.

No. 2.

2400 c. cm.	Pure water	80 oz.
150 grms.	Carbonate soda crystals	5 oz.

To develop take of

60 c. cm.	Pure water	2 oz.
30 c. cm.	Solution No. 1	1 oz.
30 c. cm.	Solution No. 2	1 oz.

Eikonogen Hydrochinon Developer.

No. 1.

1920 c. cm.	Pure water	64 oz.
30 grms.	Eikonogen	1 oz.
4 grms.	Hydrochinon	⅛ oz.
75 grms.	Sulphite soda crystals	2½ oz.

No. 2.

1920 c. cm.	Pure water	64 oz.
75 grms.	Carbonate potassium, dry	2½ oz.

To develop take

60 c. cm.	Solution No. 1	2 oz.
30 c. cm.	Solution No. 2	1 oz.

And old developer solution (previously used) in sufficient quantity to produce best results.

NEW FORMULAE AND MEMORANDA.

Pyrocatechin Developer.

Pyrocatechin	1 oz.
Bromide of potassium	30 gr.
Sulphite of soda	4 gr.
Caustic soda (in sticks)	½ oz.
Boiled or distilled water	20 oz.

Dissolve each ingredient in the order given. For use take 1 ounce of this stock solution to 7 or 8 ounces of water.

Rodinal Developer.

One part rodinal to 30 parts pure water.
Use repeatedly, adding fresh as required.

CRAMER PLATES.

Pyro Developer.

Alkaline Solution.

Water	60 oz.
Carbonate of sodium crystals (sal soda)	5 oz.
Sulphite of sodium crystals	10 oz.

A smaller quantity of sulphite will produce a warmer tone, a larger quantity a gray or bluish-black tone.

The alkaline solution must be kept in well-stoppered bottles.

If the negatives show yellow stain, make a fresh solution, or try another lot of sulphite of sodium.

To prepare the alkaline solution with the hydrometer, mix equal parts of the following solutions:

Carbonate of sodium solution	hydrometer test 40.
Sulphite of sodium solution	hydrometer test 80.

Pyro Solution.

Dissolve 1 drachm sulphite of sodium crystals in 6 ounces distilled or pure ice water, add acetic acid until the solution turns blue litmus paper red, and finally add 1 ounce pyrogallic acid. Mix in the following proportions:

Pyro solution	1 dr.
Alkaline solution	1 oz.
Tepid water (for Winter use)	2 oz.
or,	
Cold water (for Summer use)	3 to 5 oz.

If the high lights are flat, use more pyro solution.

If they are too intense, use less pyro solution.

If too little pyro is used, the alkali will be in excess and cause fog.

Metol and Hydrochinon Developer. Thoroughly dissolve:

Metol	¼ oz.
Hydrochinon	¼ oz.
In water	80 oz.

then add

Sulphite of soda, crystals	4 oz.
Carbonate of soda crystals	2½ oz.

To prepare this with hydrometer, mix

Sulphite of soda solution, testing 60	20 oz.
Carbonate of soda solution, testing 30	20 oz.
Metol	¼ oz.
Hydrochinon	¼ oz.

Dissolved in 40 ounces water.

For Summer use, dilute the developer with an equal quantity of water, also for large plates, so that the development does not proceed too rapidly and can be properly controlled.

If negatives of less contrast are desired, use less hydrochinon and more metol.

Metol-Bicarbonate Developer. Thoroughly dissolve:

Metol	1 oz.
In water	60 oz.

then add

Sulphite of soda, crystals	6 oz.
Bicarbonate of soda	3 oz.

To prepare with hydrometer, mix

Sulphite of soda solution, testing 75	30 oz.
Bicarbonate of soda solution, testing 50	30 oz.
Metol	1 oz.

Dissolved in 12 ounces water.

Bromo-Hydrochinon Developer. For producing great contrast and intensity, also for developing over-exposed plates.

No. 1.

Distilled or ice water	25 oz.
Sulphite of soda, crystals	3 oz.
Hydrochinon	½ oz.
Bromide of potassium	¼ oz.

Dissolve by warming and let cool before use.

No. 2.

Water	25 oz.
Carbonate of soda crystals	6 oz.

Mix Nos. 1 and 2, equal parts, for use.

SEED PLATES.

Pyro A B C Developer. By Weight.

A

Water	10 oz.
Sulphite of soda crystals	½ oz.

Add enough pure acetic acid to this to turn blue litmus paper slightly red, then add:

Pyro	1 oz.

B

Water	16 oz.
Sulphite of soda crystals	4 oz.

C

Water	16 oz.
Sal soda crystals	4 oz.

To develop take of

A	½ oz.
B	1 oz.
C	1 oz.
* Water	8 oz.

* For double-coated plates use 18 ounces of water.

Eikonogen-Hydrochinon Developer.

No. 1.

Distilled or pure well water	32 oz.
Sodium sulphite (crystals)	4 oz.
Eikonogen	240 gr.
Hydrochinon	60 gr.

No. 2.

Water	32 oz.
Carbonate of potash	4 oz.

To develop take

No. 1	2 oz.
No. 2	1 oz.
† Water	1 oz.

† For double-coated plates use 5 ounces of water.

By Hydrometer. No. 1.

Sodium sulphite solution to test 30	34 oz.
Eikonogen	240 gr.
Hydrochinon	60 gr.

No. 2.

Carbonate of potash solution to test 50.............

To develop take

No. 1	2 oz.
No. 2	1 oz.
† Water	1 oz.

† For double-coated plates use 5 ounces of water.

Hydrochinon Developer. A

Hydrochinon	1 oz.
Sulphite of soda crystals	5 oz.
Bromide of potassium	10 gr.
Water (ice or distilled)	55 oz.

B

Caustic potash	180 gr.
Water	10 oz.

To develop.

Take of A, 4 ounces; B, ½ ounce. After use pour into a separate bottle. This can be used repeatedly, and with uniformity of results by the addition of one drachm of A and 10 drops of B to every 8 ounces of old developer.

In using this developer it is important to notice the temperature of the room, as a slight variation in this respect causes a very marked difference in the time it takes to develop, much more so than with pyro. Temperature of room should be from 70 to 75 degrees Fahr.

Metol Developer. No. 1.

Water	8 oz.
Metol	100 grs.
Sulphite of soda crystals	1 oz.

No. 2.

Water	10 oz.
Potassium carbonate	1 oz.

Take equal parts of 1 and 2 and six parts of water. If more contrast is needed, take equal parts of 1 and 2 and three parts of water, with five drops to the ounce of a 1-10 solution of bromide of potassium.

NEW FORMULAE AND MEMORANDA.

Metol-Hydro Developer. For black-tone transparency and lantern plates.

A

Water	16 oz.
Metol	30 gr.
Hydrochinon	30 gr.
Sodium sulphite (dry)	120 gr.

B

Water	16 oz.
Potassium bromide	15 gr.
Sodium carbonate (dry)	120 gr.

If the crystalized sulphite and carbonate are used, take twice as much of each as the formula calls for. To develop, take equal parts of A and B. Developer should not be lower than 75° Fahr. in winter and not higher than 70° Fahr. in summer, and can be used repeatedly, but should be discarded as soon as discolored, as it will then stain the film.

CARBUTT PLATES AND GAS LIGHT PAPERS.

Pyro Developer. No. 1 Pyro Stock Solution.

Distilled or ice water	10 oz.
Oxalic acid	15 grs.
Bromide potass	30 grs.

Then add pyro 1 ounce and water to make 16 fluid ounces.

No. 2 Stock Soda Solution.

Water	20 oz.
Soda sulphite crystals (or dry 4 oz.)	8 oz.
Soda carb. crys. (or dry gran. 2 oz.)	4 oz.
Potash carbonate	2 oz.

Dissolve, and add water to make measure 32 fluid ounces.

No. 3 Bromide Solution.

Bromide of sodium or potassium	½ oz.
Water	5 oz.

Pyro Developer.

No. 1	2 drachm.
No. 2	4 drachm.
Water	3 oz.

Pyro-Metol Developer. For Dry Plates.

No. 1.

Water boiled or distilled	16 oz.
Sulphite soda gran. (or crystal, 480 grs.)	240 grs.
Citric acid	60 grs.
Bromide potass	16 grs.
Pyro	45 grs.
Metol	35 grs.

Mix in the order named.

"JIS' A STUDYIN'." Elizabeth W. Nott.

No. 2.

Water boiled or distilled	16 oz.
Carbonate soda gran. (or crystals, 8 oz.)	1½ oz.

For use take 1 ounce each Nos. 1 and 2 and 1 ounce water, for soft effect or under timed exposure use 2 ounces water, to secure strong contrasty negatives use equal parts No. 1 and 2.

Metol-Hydro Developer. For Plates and Developing Papers.

20 oz.	Water	600 c. cm.
30 grs.	Metol	2 grms.
10 grs.	Hydrochinone	⅔ grms.
110 grs.	Sulphite soda gran	7 grms.
110 grs.	Carbonate soda gran	7 grms.
2 grs.	Potassium bromide	2-10 grms.

Mix in the order named.

Keep in bottle well corked; do not return to the stock the portion used, but place in bottle for further use. This developer is also suitable for developing gas light papers.

Temperature of developer should not exceed 75° in summer, or below 65° in winter, as between these two degrees are best results secured.

Hydroquinone Developer. For producing Brilliant and Black Tones on Vinco and Gravura, also for use on Carbutt's new Process Plates.

American.	No. 1.	Metric.
20 oz.	Water distilled or boiled	600 c.c.
1 oz.	Sulphite soda crystal	30 grms.
160 grs.	Hydroquinone	10 grms.
30 grs.	Citric acid	2 grms.
15 grs.	Potassium bromide	1 grm.

No. 2.

20 oz.	Water	600 c.c.
180 grs	Caustic soda or potash	11 grms.

For use mix equal parts 1 and 2.

Fixing Bath.

32 oz.	Water	960 c. cm.
1 drachm.	Sulphuric acid	4 c. cm.
1 oz.	Sulphite of soda dry	30 grms.
8 oz.	Hyposulphite soda	240 grms.
1 oz,	For dry plates add chrome alum	30 grms.

STANLEY PLATES.

Pyro Developer. No. 1. Alkaline Solution.

Pure water	80 oz. Fluid
Sulphite of soda crystals	6 oz. Troy
Carbonate of soda crystals	6 oz. Troy

No. 2. Pyro Solution.

Water	80 oz.
Sulphuric acid	½ dr.
Pyro	1 oz. Troy

For use mix No. 1 and No. 2 in equal parts.
To make the same developer with hydrometer test.

Carbonate of soda	40 oz.	hydrometer test 40.
Sulphite of soda	40 oz.	hydrometer test 40.

Mix the two for alkaline solution and use pyro solution as above.

Metol and Hydrochinon Developer.

Metol	¼ oz.
Hydrochinon	¼ oz.
Water	80 oz.
Sulphite of soda crystal	4 oz.
Carbonate of soda crystals	2½ oz.

Dissolve in the order given.

If the above works too energetically dilute with pure water until the desired result is obtained.

Pyro. Pyrol Tolidol Developer,

No. 1.

Pyro	3 oz.
Pyrol	3 oz.
Tolidol	1 oz.
Acetic acid	1 dr.
Sulphite soda	1 dr.
Water	84 oz.

For use take:

No. 1	6 oz.
Sal. soda, test 30°	6 oz.
Sulphite soda, test 60°	6 oz.
Bromide, 10 per cent. solution	1 dr.
Water	22 oz.

NEW YORK PLATES.

Pyro and Soda Developer.

No. 1.

300 c. cm.	Distilled or ice-water	10 oz.
120 grms.	Sulphite of soda	4 oz.

Dissolve, then add

30 grms.	Pyrogallic acid	1 oz.

No. 2.

300 c. cm.	Distilled or ice-water	10 oz.
120 grms.	Sal soda	4 oz.

Dissolve, then add water to make up 16 fluid ounces or 480 c. cms.

No. 3.

14 grms.	Bromide potassium	½ oz.
150 c. cm.	Water	5 oz.

To develop take

30 c. cm.	No. 1	1 oz.
30 c. cm.	No. 2	1 oz.
180 c. cm.	Water	6 oz.

NEW FORMULAE AND MEMORANDA.

No. 2.

Water	64 oz.
Sulphite sodium crystals	8 oz.
Carbonate sodium	4 oz.

Take of

No. 1	1 oz.
No. 2	5 oz.
Water	2 to 4 oz.

Pyro-Metol One Solution Developer.

Water	8 to 10 oz.
Oxalic acid	8 gr.
Pyrogallic acid	32 gr.
Metol (Hauff)	8 gr.
Sulphite of sodium crystals	5 dr.
Carbonate of sodium crystals	2½ dr.
Bromide of potassium	1 gr.

Orto-Metol Developer. Formula by Henry Wenzel, Jr.

For amateurs making up a small quantity of developer, and for those who desire a stainless developer, the following is recommended. It gives pyro effects, keeps well, and can be used repeatedly.

Water	10 oz.
Metol (Hauff)	12 gr.
Metabisulphite of potassium	6 gr.
Ortol	18 gr.
Sulphite of sodium crystals	½ oz.
Carbonate of potassium	80 gr.
Bromide of potassium	5 to 10 gr.
Hyposulphite of soda	1 gr.

Metol-Hydrochinon Developer.

Metol	12 gr.
Hydrochinon	48 gr.
Sulphite of soda c. p. dry	192 gr.
Carbonate of soda c. p. dry	348 gr.
Bromide of potassium	16 oz.

To Use.—Take of above, 1 part; water 1 to 2 parts.

ANSCO TRANSPARENT FILM CARTRIDGES.

For use in Ansco Cameras, also adapted to Kodaks, Bulls-Eyes, Buck-Eyes, Hawk-Eyes and other cameras using cartridge films. They may be satisfactorily handled in the same manner, and developed and fixed by the same formulas that have been used for other films, with at least as good results. The principal differences noticed are the less tendency to fog and the better keeping quality of the Ansco film.

Developing.

The correct way of developing films or plates is by treating each exposure or negative individually according to the time of exposure, nature of the subject and other conditions, and the *Ansco* films are so prepared that each exposure may be cut apart without the risk of the end of the film rolling up over the end of the paper as is the case with other brands of films.

This feature of the *Ansco* film is protected by U. S. Patent No. 727,283, May 5th. 1903.

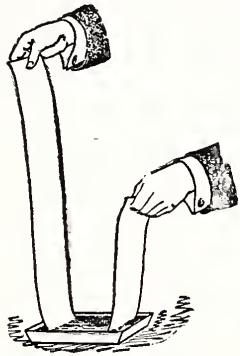
The Beginner, however, is not able to judge of the conditions in development and we, therefore, suggest for the beginner the more expeditious way of developing the films in strips as follows :

Strip Development.

a. Unroll the film and detach the entire strip of film from the black paper, taking care not to touch the face of the film in so doing.

b. Pass the fims, face down, through the tray of clean cold water, as shown in cut, holding one end in each hand, Pass through the water several times, that there may be no bubbles remaining on the film. When it is thoroughly wet, with no air bubbles, place the strip of film in a pail or wash-bowl of clean cold water which is large enough so that the film may be immersed fully without folding tightly enough to crack it.

c. Now prepare the developer and pass the film through it in the same manner as described for wetting it, and shown in cut. Keep it constantly in motion, and in about one minute the high lights will begin to darken and you will readily be able to distinguish the unexposed section between the negatives. If the negatives develop evenly, development may be completed before cutting them apart.



d. If some of the negatives flash up more quickly than the others, cut the negatives apart with a pair of shears and place them in a tray of clear water. The negatives may now be immersed in the developer one at a time and developed in the usual manner.

Machine Development.

There are many who will wish to develop in the McCurdy Developing Box, lately advertised under the registered trade mark "Kodak" and to facilitate the development of *Ansco* films in the machine, the *Ansco* film is put up ready prepared for the development machine, so as to remove the inconvenience and the loss of time met with other brands of films, to say nothing of the risk of fogging the film while endeavoring to paste the extreme end of the film to the black paper. The method employed in attaching and interlocking both ends of the Ansco film with the black paper is protected by U. S. Letters Patent No. 727,283, dated May 5th, 1903. This method prevents the film from bucking or bunching in the camera.

Developing Formulas.

Metol-Hydro.

2000 c. c.	Water	60 oz.
10 grms.	Metol	60 gr,
125 grms.	Soda sulphite (grn).	4 oz
60 grms.	Soda carbonate (grn)	2 oz.
4 grms.	Hydrochinone.	30 gr.
1 grm.	Potass bromide	5 gr.

Add chemicals in the order given.

Pyrocatechin.

7 grms.	Pyrocatechin	¼ oz.
25 grms	Soda sulphite (dry powder)	1 oz.
50 grms.	Soda carbonate (dry powder)	2 oz.
900 grms.	Water	30 oz.

Pyro.—No. 1.

Water	24 oz,
Soda sulphite (crys)	2 oz.
Citric acid	60 gr.
Bromide Ammonium	20 gr.
Pyrogalic acid	1 oz.

No. 2.

Water	24 oz.
Soda sulphite (crys.)	2 oz.
Potash carbonate	3 oz.

For exposures correctly timed, mix No. 1, 1 dram; No. 2, 1 dram; water, 2 ounces.

Wheeler's Formula.

Water	128 oz.
Metol	1 drachm.
Sulphite soda dry	3 oz.
Hydrochinone	½ oz.
Carbonate soda	2 oz.
Bromide potassium	20 grs.

Fixing Bath.

Water	16 oz.
Hyposulphite soda	4 oz.

Soaking Solution,

Water	32 oz.
Glycerine	½ to 1 oz.

The lesser quantity of glycerine to be used in the summer and the greater in the winter, or when the atmosphere is very dry.

GENERAL FORMULA FOR ALL PURPOSES.

Edinol.

The following formula can be made up in one or two solutions, and is recommended to the amateur as the best and most convenient general formula for all-round purposes, producing excellent results on either plates, films, gaslight printing or bromide papers. It keeps in indefinitely and can be used repeatedly.

A.

100 c.c.	Water	3½ ozs.
10 g.	Sdium soulphite (des.)	150 grs.
2 g.	Edinol	30 grs.

B.

100 c.c.	Water	3½ ozs.
10 g.	Sodium carbonate (des.)	150 grs.

Ten g. (150 grains) sodium sulphite (des.) may be replaced by 4 g. (60 grains) acetonesulphite-bayer, with excellent results, or by the corresponding quantity of the concentrated stock solution (about 2¼ drachms).

For plates and films take 1 ounce of A and 1 ounce of B. This may be diluted if slower development is desired.

To increase contrast take more of A than of B; to increase softness take more of B than of A.

For gaslight printing paper take 1 ounce of A and 1 ounce of B, and add enough potassium bromide (10% solution) to keep whites clear. This may be diluted if slower development is desired.

For bromide paper take 1 ounce of A and 1 ounce of B, and add a few drops of potassium bromide (10% solution). This may be diluted if slower development is desired.

Over exposures, no matter how great, can be controlled perfectly by adding 10 drops of acetonesulphite (50% solution) to each ounce of developing solution.

For extreme under exposures take 2 ounces of A and 1 ounce of B *without diluting*.

I.—For Films.

A.

100 c.c.	Water	8½ ozs.
10 g.	Sodium sulphite (des)	150 grs.
2 g.	Edinol	10 grs.

B.

100 c.c.	Water	3½ ozs.
10 g.	Potassium carbonate (des.)	150 grs.

Use the same as formula No. 1. Gives stronger and more brilliant negatives.

II.

1000 c.c.	Water	1 qt.
100 g.	Sodium sulphite (des.)	3⅛ ozs.
5 g.	Edinol	75 grs.
5 g.	Hydroquinone	75 grs.
20 g.	Potassium carbonate (des.)	300 grs.
22 g.	Sodium carbonate (des.)	330 grs.
4 g.	Caustic soda	60 grs.
1 g.	Potassium bromide	15 grs.

Pyro-Edinol. A.

Water	7 ozs.
Acetone sulphite	30 grs.
Pyro	15 grs.
Edinol	30 grs.

B

Water	7 ozs;
Sodium carbonate	1 oz.
Potassium carbonate	150 grs.

For use take equal parts of A and B and dilute with from 4 to 6 parts of water.

Pyrocatechin-Phosphate Developer.

Solution A.

Crystalized sulphite of soda	386 gr.
Pyrocatechin	77 gr.
Water	8 oz.

Solution B.

Ordinary crystal phosphate of sodium	725 gr.
Caustic soda (purified, in sticks)	77 gr.
Water	8 oz.

Mix one part of A with one part of B and from one to three parts of water. If the exposure is not absolutely normal we recommend to add to the above developer a few drops of a solution of bromide of potassium (1.10).

Pyrocatechin Developer (One Solution). Dissolve in the following range:

Sulphite of soda crystalized	25½ dr.
Caustic soda (purified, in sticks)	3½ dr.
Distilled water	14 oz.
Pyrocatechin	308 gr.

The pyrocatechin must not be added until the sulphite and caustic soda are entirely dissolved. For use the concentrated developer is to be diluted with from ten to twenty times as much water. The normal proportion is one part of developer in fifteen parts of water.

Vogel's Pyrocatechin Combined Developer and Fixing Solution.

Sulphite of soda crystalized	463 gr.
Water	2⅝ oz.
Caustic potash (purified in sticks)	108 gr.
Pyrocatechin	108 gr.

mix for a normally fixing plate of 5 x 7 inches.

Developer	3 dr.
Fixing soda solution (1:5)	5½ dr.
Water	1 oz.

The process of developing and fixing with this solution is accomplished in a few minutes. The picture first appears as usually, strengthens very quickly, and shortly after the fixing is entirely done.

Ellon's Pyrocatechin Developer.

Pyrocatechin .... 2 per cent. solution
(2 grms. pyrocatechin in 100 c. cm. of water).
Carbonate of potassium .... 10 per cent. solution
(10 grms. carbonate in 100 c. cm. of water).

For use take equal parts and add water as desired.

Bothamley's Pyro Developer. A. Stock Pyro Solution.

Metabisulphite of potassium	1 oz.
Water	8 oz.
Pyrogallic acid	1 oz.
Water .... to make	10 oz.

B

Stock pyro solution	1 oz.
Water	10 oz.

C

Carbonate of sodium crystals	1 oz.
Sulphite of sodium	1 oz.
Bromide of potassium	10 gr.
Water .... to make	10 oz.

For use mix equal parts B and C.

Imperial Standard Developer: A

Metabisulphite of potassium	120 gr.
Pyrogallic acid	55 gr.
Bromide of potassium	20 gr.
Metol	45 gr.
Water	20 oz.

B

Carbonate of soda	4 oz.
Water	20 oz.

For use mix equal parts A and B.

Bardwell's Pyro-Acetone Developer.

Water	4 oz.
Sulphite of sodium (saturated solution)	4 dr.
Acetone	2 dr.
Pyro	10 grms.

Hauff's Adurol Developer. One Solution.

Water	10 oz.
Sulphite of sodium crystals	4 oz.
Carbonate of potassium	3 oz.
Adurol	½ oz.

For studio-work and snap-shots take 1 part with 3 parts water.
For time exposures out-door take 1 part with 5 parts water.

Glycin Developer.

A

Hot water	10 oz.
Sulphite of sodium crystals	1¼ oz.
Carbonate of sodium	¼ oz.
Glycin	½ oz.

Add to water in order given.

B

Water	10 oz.
Carbonate of potash	1¼ oz.

For normal exposure take A, 1 ounce; B, 2 ounces; water, 1 ounce.

Imogen Developer.

A

Hot water	9 oz.
Sulphite of sodium crystals	385 gr.
Imogen	123 gr.

B

Hot water	4½ oz.
Carbonate of sodium	2 oz.

For use take 2 ounces A and 1 of B.

Diogen Developer.

Water	9 oz.
Sulphite of sodium	3½ oz.
Diogen	7 dr.
Carbonate of potassium	4½ oz.

For normal exposure take 4 drams of this solution; dilute with 2 ounces, 1 dram of water, and add 2 drops bromide of potassium 10 per cent. solution.

Ortol Developer. Formula by Pentlarge.

A

Water	1 oz.
Metabisulphite of potassium	4 gr.
Ortol	8 gr.

B

Water	1 oz.
Sulphite of sodium	48 gr.
Carbonate of potassium	16 gr.
Carbonate of sodium	32 gr.

For use take equal parts A and B, and an equal bulk of water.

Metacarbol Developer.

Metacarbol	25 gr.
Sulphite of soda crystals	100 gr.
Caustic soda	50 gr.
Water	10 oz.

Dissolve the metacarbol in water, then add the sulphite, and when dissolved add the caustic soda and filter.

COMPARATIVE DEVELOPING FORMULAE.

BY ULYSSES G. ORR.

A comparison of the following formulæ will show at a glance the relative proportions of chemicals best adapted to the development of different brands of plates.

If solutions be made up separately, suitable developer can readily be prepared for the particular brand of plates in use at the time. Solutions should be prepared by using less than the quantity of water required, and after the salts are dissolved, adding water to make the desired quantity. For example, a 1:5 solution is required. Dissolve 1 ounce of the salt in about 4 ounces of water, then add water to make 5 ounces.

The most convenient form of using the formulæ is the 1:5 solutions shown in the right-hand column of weights and measures. There being practically no loss then through deterioration, as is the case when developer is made up in one or two solutions; this is also an economical method. Suppose a pyro developer is required for a Cramer plate. For each ounce of developer wanted, measure off 5 drams and 5 minims of water, to which add 1 dram and 57 minims of the 1:5 sulphite solution, then 2.9 grains of dry pyro. When dissolved, add 58 minims of the 1:5 soda carbonate solution and developer can be used at once. It is best to get everything ready before making up developer, as pyro oxidizes very rapidly after developer is mixed. Should one have occasion to use a strange plate, the proper developer can be made up from the left-hand column in small quantities, if one does not care to adopt the 1:5 solution method. Proceed as follows: For 1 ounce of developer take about ¾ of an ounce of water, and add the salts, in crystals, in the order given; when all are dissolved, add water to make 1 ounce of solution. Unless one has some knowledge of the action of the salts used, it is a safe rule to let each chemical dissolve before adding the next one.

In making up developer from left-hand column, and in making the 1:5 solutions for these formulæ, use the crystallized sulphite and carbonate in all cases, or their equivalent, if the crystals cannot be obtained.

In mixing up pyro developer for immediate use, the acid may be omitted.

The tendency of a greater or less quantity of any factor in the developer is as follows:

REDUCER. More—clogs up whites; too much contrast.
Less—slow development; lack of brilliancy.

ALKALI. More—quick development; dense, flat negatives; fog and granulation.
Less—slow development; contrast.

SULPHITE. More—colder tone.
Less—warmer tone; stain.

WATER. More—thin in high lights; detail.
Less—contrast.

TEMPERATURE. Should be about 70 deg. F.
Higher—intensity; fog.
Lower—flatness.

The warmer and closer the atmosphere in which the negative is dried, the more intense it becomes.

PYRO. Cramer.

1 oz.	Water	6 dr. 12	m.
14.5 gr.	Sodium sulphite (1:5)	1 dr. 12	m.
.07 gr.	Oxalic acid		
2.8 gr.	PYRO	2.8	gr.
7.2 gr.	Sodium carbonate (1:5)	36	m.

PYRO. Seed.

1 oz.	Water	6 dr.	24	m.
8 gr.	Sodium sulphite (1:5)		40	m.
2.7 gr.	PYRO		2.7	gr.
.08 m.	Sulphuric acid			
11.2 gr.	Sodium carbonate (1:5)		56	m.

PYRO. Carbutt.

1 oz.	Water	4 dr.	53	m.
.08 gr.	Oxalic acid			
.15 gr.	Potassium bromide (1.10)		1.5	m.
2.1 gr.	PYRO		2.1	gr.
22.43 gr.	Sodium sulphite (1:5)	1 dr.	52	m.
11.12 gr.	Sodium carbonate (1:5)		56	m.
5.6 gr.	Potassium carbonate (1:5)		18	m.

PYRO. Hammer.

1 oz.	Water	6 dr.	48	m.
.05 gr.	Oxalic acid			
1.35 gr.	PYRO		1.35	gr.
9.6 gr.	Sodium sulphite (1:5)		48	m.
4.8 gr.	Sodium carbonate (1:5)		24	m.

PYRO. Wuestner.

1 oz.	Water	6 dr.	15	m.
13.54 gr.	Sodium sulphite (1:5)	1 dr.	8	m.
1.69 gr.	PYRO		1.69	gr.
.016m.	Sulphuric acid			
7.44 gr.	Sodium carbonate (1:5)		37	m.

PYRO. Harvard.

1 oz.	Water	6 dr.	45	m.
7.44 gr.	Sodium sulphite (1:5)		37	m.
.24 gr.	Citric acid			
.1 gr.	Ammonium bromide (1:10)		1	m.
1.9 gr.	PYRO		1.9	gr.
7.29 gr.	Potassium carbonate (1:5)		37	m.

PYRO. Stanley.

1 oz.	Water	5 dr.	12	m.
.18 m.	Sulphuric acid			
2.97 gr.	PYRO		2.97	gr.
16.92 gr.	Sodium sulphite (1:5)	1 dr.	24	m.
16.92 gr.	Sodium carbonate (1:5)	1 dr.	24	m.

PYRO-AMMONIA.

1 oz.	Water	7 dr.	40	m.
2 gr.	PYRO		2	gr.
.1 gr.	Potassium bromide (1:10)		1	m.
.8 m.	Ammonia, .88 (1:10)		8	m.

METOL. Hauff.

1 oz.	Water	4 dr.	12	m.
2.3 gr.	METOL		2.3	gr.
18.5 gr.	Sodium sulphite (1:5)	1 dr.	32	m.
26.8 gr.	Sodium carbonate (1:5)	2 dr.	14	m.
.25 gr.	Potassium bromide (1:10)		2	m.

HYDROCHINON

1 oz.	Water	4 dr.	40	m.
3.6 gr.	HYDROCHINON		3.6	gr.
18 gr.	Sodium sulphite (1:5)	1 dr.	30	m.
22 gr.	Potassium carbonate (1:5)	1 dr.	50	m.

EIKONOGEN. Seed.

1 oz.	Water	3 dr.		
21 gr.	Sodium sulphite (1:5)	1 dr.	55	m.
7 gr.	EIKONOGEN		7	gr.
37 gr.	Sodium carbonate (1:5)	3 dr.	5	m.

AMIDOL.

1	oz.	Water	3 dr.	50	m.
50	gr.	Sodium sulphite (1:5)	4 dr.	10	m.
5	gr.	AMIDOL		5	gr.

DIOGEN.

1	oz.	Water		50	m.
24	gr.	Sodium sulphite (1:5)	2 dr.		
6	gr.	DIOGEN.		6	gr.
62	gr.	Sodium carbonate (1:5)	5 dr.	10	m.
.08	gr.	Bromide (1:10)		.8	m.

PYROCATECHIN. Dr. E. Vogel.

1	oz.	Water	7 dr.	20	m.
7	gr.	Sodium sulphite (1:5)		35	m.
1	gr.	Caustic soda (1:5)		5	m.
1.5	gr.	PYROCATECHIN		1.5	gr.

PYROCATECHIN-FIXING. P. Hanneke.

1	oz.	Water	2 dr.	40	m.
26	gr.	Sodium sulphite (1:5)	2 dr.	10	m.
6	gr.	Caustic potash (1:5)		30	m.
6	gr.	PYROCATECHIN		6	gr.
80	gr.	HYPO (1:5)	2 dr.	30	m.

GLYCIN. Hauff.

1	oz.	Water	3 dr.		
30	gr.	Potassium carbonate	2 dr.	30	m.
30	gr.	Sodium sulphite	2 dr.	30	m.
5.85	gr.	GLYCIN		5.85	gr.

ORTOL. Hauff.

1	oz.	Water	3 dr.		
1.7	gr.	Potassium metabisulphate			
3.4	gr.	ORTOL		3.5	gr.
35.7	gr.	Sodium sulphite (1:5)	3 dr.		
23.8	gr.	Sodium carbonate (1:5)	2 dr.		

METOL-PYRO. Hammer.

1	oz.	Water	7 dr.	8	m.
1.36	gr.	METOL		1.36	gr.
.34	gr.	PYRO		.34	gr.
6.8	gr.	Sodium sulphite (1:5)		34	m.
3.45	gr.	Potassium carbonate (1:5)		18	m.

METOL-HYDROCHINON.

1	oz.	Water	4 dr.	45	m.
1.5	gr.	METOL		1.5	gr.
1.5	gr.	HYDROCHINON		1.5	gr.
24	gr.	Sodium sulphite (1:5)	2 dr.		
15	gr.	Sodium carbonate (1:5)	1 dr.	15	m.

METOL-GLYCIN.

1	oz.	Water	7 dr.	30	m.
1.6	gr.	METOL.		1.6	gr.
3	gr.	Sodium sulphite (1:5)		15	m.
3	gr.	Potassium carbonate (1:5)		15	m.
1.6	gr.	GLYCIN		1.6	gr.

BROMO-HYDROCHINON. Cramer.

1	oz.	Water		55	m.
26.6	gr.	Sodium sulphite (1:5)	2 dr.	13	m.
4.44	gr.	HYDROCHINON		4.44	gr.
2.22	gr.	Potassium bromide (1:10)		22	m.
54	gr.	Sodium carbonate (1:5)	4 dr.	30	m.

EIKONOGEN-HYDROCHINON. Seed.

1	oz.	Water	4 dr.	30	m.
27.7	gr.	Sodium sulphite (1:5)	2 dr.	18	m.
3.46	gr.	EIKONOGEN		3.46	gr.
.86	gr.	HYDROCHINON		.86	gr.
14.37	gr.	Potassium carbonate (1:5)	1 dr.	12	m.

METOL-HYDROCHINON. Velox, N. C. Co.

1	oz.	Water	3 dr.		
.7	gr.	METOL		.7	gr.
20	gr.	Sodium sulphite (1:5)	1 dr.	40	m.
3	gr.	HYDROCHINON		3	gr.
40	gr.	Sodium carbonate (1:5)	3 dr.	20	m.
.1	gr.	Potassium bromide (1:10)		1 to 6	m.

AMIDOL. Velox, N. C. Co.

1	oz.	Water	4 dr.		
48	gr.	Sodium sulphite (1:5)	4 dr.		
5	gr.	AMIDOL		5	gr
.1	gr.	Potassium bromide (1:10)		2 to 6	m.

FERROUS-OXALATE. Nepera Bromide Paper.

A.	Oxalate of potash	1 dr.	56	gr.
	Hot water	5 dr.	50	m.
B.	Proto-sulphate of iron		28	gr.
	Hot water	1 dr.	25	m.
	Citric acid		.1	gr.
C.	Potassium bromide (1:10)		1	m.

METOL-HYDROCHINON. Dekko Paper.

1	oz.	Water	2 dr.	50	m.
.66	gr.	METOL		.66	gr.
23	gr.	Sodium sulphite (1:5)	1 dr.	55	m.
2.86	gr.	HYDROCHINON		2.86	gr.
38	gr.	Sodium carbonate (1:5)	3 dr.	10	m.
.5	gr.	Potassium bromide (1:10)		5	m.

FIXING AND CLEARING BATHS.

The Acid Fixing and Clearing Bath.

Add 2 ounces of S. P. C. Clarifier (acid bisulphite of sodium) solution to 1 quart of hypo solution 1 in 5.

Combined Alum and Hypo Bath.

Add saturated solution of sulphite of sodium to saturated solution of alum till the white precipitate formed remains undissolved, and when the odor of sulphurous acid becomes perceptible.

Mix this solution with an equal bulk of freshly-prepared hypo solution 1 in 5, and filter.

This bath will remain clear.

Clearing Solution (Edward's).

Alum	1 ounce avoirdupois
Citric acid	1 ounce "
Sulphate of iron, crystals	3 ounces "
Water	1 Imperial pint

This should be freshly mixed.

Clearing Solution.

Saturated solution of alum	20 ounces
Hydrochloric acid	1 ounce

Immerse negative after fixing and washing. Wash well after removal.

INTENSIFIERS AND REDUCERS.

Intensifier (Mercuric) with Sodium Sulphite, for Gelatine Dry-Plates.

Whiten the negative in the saturated solution of mercuric chloride, wash and blacken with a solution of sulphite of sodium 1 in 5. Wash well.

The reduction is perfect, with a positive black tone.

Intensifier with Iodide of Mercury.

Dissolve 1 drachm of bichloride of mercury in 7 ounces of water and 3 drachms of iodide of potassium in 3 ounces of water, and pour the iodide solution into the mercury till the red precipitate formed is completely dissolved.

For use, dilute with water, flow over the negative till the proper density is reached, and wash, when the deposit will turn yellow. Remove the yellow color by flowing a 5 per cent. solution of hypo over the plate, and give it the final washing.

Agfa Intensifier.

One part of Agfa solution in 9 parts water (10 per cent. solution). Immerse negative from 4 to 6 minutes.

Reducer for Gelatine Dry-Plate Negatives (Farmer's).

Sat. sol. of ferricyanide of potassium	1 part
Hyposulphite of sodium solution, 1 in 10	10 parts

Reducer for Gelatine Dry-Plates.

Perchloride of iron	30 gr.
Citric acid	60 gr.
Water	1 pint

Belitski's Acid Ferric-Oxalate Reducer for Gelatine Plates.

Water	7 ounces
Potassium ferric oxalate	2½ drachms
Crystallized neutral sulphite of sodium	2 drachms
Powdered oxalic acid, from	30 to 45 gr.
Hyposulphite of soda	1½ ounces

The solution must be made in this order, filtered, and be kept in tightly-closed bottles; and as under the influence of light the ferric salt is reduced to ferrous, the preparation must be kept in subdued light, in non-actinic glass bottles.

Orthochromatic Dry-Plates — Erythrosine Bath (Mallman and Scolik).

Preliminary Bath.

A.—Water	200 C.c.
Stronger ammonia	2 C.c.

Soak the plate for two minutes.

Color Bath.

Erythrosine solution, 1 in 1000	25 C.c.
Stronger ammonia (0.900)	4 C.c.
Water	175 C.c.

The plate should not remain longer in this bath than one and a quarter minutes.

NEW FORMULAE AND MEMORANDA.

PRINTING PROCESSES.

Sensitizing Plain and Albumen Paper.—The usual method of rendering paper of any kind sensitive to light is to float it for a varying length of time on a solution of silver nitrate, having previously salted it, if it be plain paper, with some chloride, usually chloride of ammonium. In practice it has been found that the strength of the silver bath should not fall below thirty grains of silver to the ounce of water, lest the albumen be dissolved; and that, save in exceptional cases, there is no need of a greater strength than sixty to sixty-five grains to the ounce. The precise strength necessary to produce the best results with any given brand of albumen paper depends upon the amount of chloride used in salting; a paper weak in chloride requiring a weak bath, while one rich in chloride demands a strong one.

Formulæ for Sensitizing Bath. For very Strong Negatives.

No. 1.

Silver nitrate	35 gr.
Water	1 oz.

Print in full sunlight.

For Thin Negatives.

No. 2.

Silver nitrate	80 gr.
Water	1 oz.

Print in the shade.

No. 3.

Silver nitrate	60 gr.
Ammonium nitrate	60 gr.
Ammonia	2 mms.
Water	1 oz.

For prints on plain, resinized, gelatinized paper and leatherized paper:

No. 4.

Silver nitrate	60 gr.
Gelatine	5 gr.
Water	1 oz.

C. W. Hearn's Formula.

No. 5.

Nitrate of silver	40 gr.
Distilled water	1 oz.

To every twenty ounces of solution add one dram of saturated solution of carbonate of soda. The bath will at once assume a creamy color; allow the solution to settle, then decant and filter. Carbonate of silver will deposit in the bottle, and this will take the organic matter from the bath and prevent it from discoloring. Allow the carbonate to remain in the bath, pouring the solution back upon after using. Then shake well and the bath will soon be ready for use again.

Keep the bath up to its full strength and occasionally add a few drops of the carbonate of soda solution.

Floating the Paper.—There should be enough of the bath poured in to cover the bottom of the pan to a depth of at least half an inch, and it should have been most carefully freed from all impurities before the sensitizing is begun. Impurities and air-bubbles are the two great enemies of the sensitizing room. Grasp the paper by the two opposite corners, albumen side

THE SPIRIT OF EASTER.
Annie W. Brigman.

down, bring the hands together, and lower the convex side to the surface of the bath; separate the hands, and the paper will float on the surface. If it shows an obstinate tendency to curl up, gently breathe upon it. This difficulty may be overcome by placing the paper, the night before sensitizing, in a damp place. Now raise one corner and look for air-bubbles. If any are found, break them with the point of a glass rod, and again lower the paper. When it has floated the proper length of time, from one to three minutes being the usual time, raise it by one corner very slowly, until another corner is free, which is then grasped by the other hand and the paper slowly withdrawn, allowed to drain a minute into a dish, and hung up by one corner to dry in the dark, or yellow light.

Points in Sensitizing. 1. Have the paper damp before silvering.

2. Before floating ascertain the condition of the bath as to strength and alkalinity.

3. Do not allow the paper to become bone-dry before printing if you wish to have rich prints. Of course, it must be dry enough not to adhere to the negative; anything more than this is not only useless, but fatal to securing the best results.

Toning Solution. 1. Stock Solution.

A.

Chloride of gold	1 gr.
Water	20 oz.

B.

Acetate of soda	15 gr.
Water	1 oz.

C.

Saturated solution of sulphate of copper.

When solution is complete, add B to A, and add 10-15 drops of C, allow to stand at least 24 hours before using. Tone only until the half tones are somewhat bluish by reflected light.

This bath will keep.

Tungstate of Soda Formula.

Chloride of gold	1 gr.
Tungstate of soda	20 gr.
Boiling water	8 oz.

Ready for use, as soon as cold. Keeps well.

Phosphate of Soda Formula. For Rich Purple Tones.

Phosphate of soda	20 gr.
Chloride of gold	1 gr.
Water	8 oz.

Ready for instant use; but does not keep well.

Platinum Bath Formula.

Bichloride of platinum solution	30 drops.
Hypo	3 gr.
Hydrochloric acid (C. P.)	5 drops.
Water	5 oz.

The platinum solution is made by dissolving enough of the salt in one ounce of water to give it a rich, sherry color, a few grains will suffice. This bath is slow, but good. It should be warmed to 70 deg. Fahr., and the free silver should be well washed out of the prints.

Borax Bath Formula.

Chloride of gold	1 gr.
Borax	30 gr.
Boiling water	8 oz.

Ready for use when cooled down to 60 deg. Fahr. Gives rich brown tones, and keeps well. An excellent bath for ready-sensitized paper.

For Sepia and Black Tones.

Chloride of gold	2 gr.
Sat. sol. chloride lime	2 drops.
Chalk (precipitated)	3 gr.
Boiling water	16 oz.

The chloride of lime solution is made by shaking a teaspoonful of the chloride in a pint-bottle full of water. When the solids have settled, decant the clear portion, which should be kept in the dark.

Allow the bath to stand at least a day before using. It improves with age.

For sepia, tone but very little, just off the red; for a black, tone to a deep purple.

Hearn's Sal Soda Formula.

Distilled or ice water	64 oz.
Acid sol. of chlo. of gold (4 grs. to 1 oz.)	1 oz.
Saturated solution of sal soda	½ oz.

Should be prepared one-half hour before use.

Hearn's Chloride of Lime Formula.

Water	40 oz.
Chloride of lime	5 gr.
Chloride of gold	4 gr.

If the chloride of gold is acid, it may be neutralized with carbonate of lime.

For resinized, gelatinized, leatherized, and plain paper:

Stock Solution.

Gold chloride	15 gr.
Water	7½ dr.

To make the bath, add two drams of the gold solution neutralized with a pinch of chalk, to ten ounces of hot water. Place two drams of acetate of soda in a quart bottle, and filter the above solution into it; make the bulk up to twenty ounces. This bath can be used in a few hours, but it improves by keeping.

Fixing Bath.

Hyposulphite of soda	4 oz.
Water	20 oz.
Ammonia	½ dr.

Printing on Plain Paper. Prepare the plain paper with

Ammonium chloride	60 to 80 gr.
Sodium citrate	100 gr.
Sodium chloride	20 to 30 gr.
Gelatine	10 gr.
Distilled water	10 oz.

or,

Ammonium chloride	100 gr.
Gelatine	10 gr.
Water	10 oz.

NEW FORMULAE AND MEMORANDA.

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are added. The solution is filtered, and when still warm the paper floated upon it for three minutes.

The salted paper is sensitized upon a neutral 45-grain silver bath.

Platinum Toning Bath, for Plain Silver Prints.

Chloroplatinite of potassium	1 grm.
Water	1 liter.
Nitric acid	5 to 10 drops.

Toning Silver Prints After Fixing (Pizzighelli).

Ammonium sulphocyanate	300 grm.
Gold chloride	3 grm.
Potassium hydrate	3 grm.
Water	1000 grm.

READY SENSITIZED PAPER.

MONARCH MATTE.

Being rich in silver it requires printing only to the point where the highest lights are slightly tinted. Wash in five or six changes of water, handling prints over each time. In cold weather a temperature of 75° Fah't is preferred. An even temperature in washing and toning baths gives best results, as at 75° you get best chemical action. Wash until no trace of free silver shows in wash waters.

For a Toning Bath take 1 grain E. A. chlo. of gold to 60 ounces of water and make slightly alkaline with

Bicarbonate of soda with purple black;
Borax for brown or olive black;
Sal soda for warm black.

The following is recommended:

Water	60 oz.
Monarch gold	1 dr.
Salt	½ teaspoonful.

Borax enough to make slightly alkaline.

Platinum Bath.

Water	20 oz.
Monarch platinum	1 dr.

For black tones, tone until the red has disappeared by transmitted light; and for olive tones, until the olive appears, and don't forget the temperature, 75°.

For Green Tones.

Water	40 oz.
Monarch platinum	1 dr.

Tone in gold bath same as usual, and then tone in this weak bath. The prints should be toning at least one half hour, and beautiful green tones may be obtained in this manner. Then wash through two changes of water, and fix in hypo bath of 10 hydrometer test, or:

Hypo	1 oz.
Water	30 oz.

Fix 10 to 15 minutes. If prints begin to bleach *after 10 to 12 minutes* they are fixed, as they will not bleach until they are thoroughly fixed in any hypo bath. Thorough washing between the gold and platinum bath and platinum and hypo are necessary, as alkali carried into the platinum from the gold bath precipitates the platinum and gives muddy whites, and acid carried from the platinum bath into the hypo makes that bath too acid and causes bleaching and flat yellow prints. Wash through two changes of water between each bath, and large batches wash more thoroughly. After fixing, wash at least one hour in running water; or, if washed by hand, not less than one half hour, handling the prints over and over, changing the water each time.

MONARCH GLACÉ.

Print a shade darker than print is desired, only slightly tinting the high lights. Change prints in subdued light. Wash thoroughly in slightly warm water, through five or six changes, or until the wash water shows no trace of silver.

Make Gold Toning Bath as follows:

Water	60 oz.
Monarch gold	1 dr.

Make slightly alkaline (Litmus test) with bicarbonate of soda for warm or purple tones.

With borax for brown tones;
With carbonate of soda for cherry tones.

Wash through two or three changes of water. Fix prints in a hypo bath of 8 hydrometer test for from 12 to 15 minutes. Wash prints after fixing in running water at least *one hour, or half an hour if washed by hand.*

ACTINO MAT.

The printing should be carried deep enough to tint the whites. Pay no attention to the shadows. The preliminary washing must be very thorough, generally requiring from seven to ten changes.

The gold bath should be made up several hours before using. Use 1 grain of gold to 32 ounces of water, and add enough of a saturated solution of borax to turn red litmus paper blue in about three or four minutes. *Bath must be very slightly alkaline.* Prints should tone in the gold in about eight minutes.

Wash prints in several changes of water between the gold and platinum baths. *This is important.*

The platinum bath should be made up several hours before use, and should not be too cold. Use three to four drams of Columbian Platinum Solution to 32 ounces of water. Prints should tone in about the same time as required in the gold; not less than five minutes. Slow toning in the platinum give the best results.

Wash in two or three changes of water before fixing. Fix ten minutes in plain hypo bath of 18 hydrometer test.

ROYAL PAPER.

The printing should be carried a few shades darker than the finished print is desired. Wash the prints in not less than six changes of clear water.

Toning. Stock Gold Solution.

Water	15 oz.
Chloride of Gold	15 gr.

To make up the toning bath, use one ounce of the gold solution to about thirty-six ounces of pure water. Test the solution with blue litmus paper for acidity and slowly add enough of a saturated solution of borax or bi-carbonate of soda (baking soda) until the bath turns the litmus paper blue. This should take about three minutes. Particular attention should be given to keeping the bath very slightly alkaline while in use; too much alkaline will give bluish tones in the whites and highlights, while insufficient alkali will cause the whites to assume a pink or old gold appearance. The prints should tone in about eight or ten minutes to secure the best results. If the bath tones slower, add more of the gold solution, and if too rapidly, more water should be added. For warm tones, tone the prints until the highlights are clear and the shadows are a cherry red. For purple or darker tones the operation should be carried somewhat further.

As soon as a print is toned transfer to clear water, and when the operation is finished give them one or two changes of clear water before fixing.

Fixing.—We recommend making up the hypo bath by hydrometer test, which should be about 18 degrees. By weight use one ounce of crystal hypo to 14 ounces of water. The prints should be fixed for about ten minutes. To prevent the softening of the film and blistering, especially during warm weather, the following hardener may be used:

Hardener.

Hot Water	64 oz.
Borax	6 oz.
Sulphate of Soda	8 oz.
Powdered Alum	16 oz.

Use 1 ounce of this solution to 16 ounces of fixing bath. During very warm weather the Hardener may be added to the first preliminary washing in about the same proportion.

After fixing, the prints should be washed very thoroughly.

Mount wet in the usual manner, burnish with hot burnisher, using hard castile soap for a lubricator.

COLOPLATIN PAPER.

In printing, if pads are used, make sure that they are dry and clean; print the paper until the highlights are tinted, or about two shades darker than the finished print should be; the prints lose but little if our directions are strictly followed. This bronzing does not appear in the finished print but changes to a pure black.

Wash print thoroughly in four changes of water. Pat down with the flat of the hand in the first wash water, which should be shallow, and you will not be troubled with curling. Take a little salt into the third washing water.

Prepare a toning bath as follows:

Stock Sol. A	Water	100 oz.
	Borax	1-8 oz.
	Acetate of Soda	1-4 oz.

Stock Sol. B	Chloride of Gold C. P	15 gr.
	Water	8 oz.

To tone take eight ounces of "A" solution to each drachm of "B" solution and add a pinch of salt.

This paper requires but little gold and tones rapidly. For a platinum black tone until shadows are cherry red; for blue black a little farther, but for olive only clear the highlights.

Wash through three thorough changes of water.

Prepare a stock solution as follows:

Chloroplatinite Potass, C. P...	15 gr.
Water...........	1½ oz.
When dissolved add Phosphoric Acid	2½ dr.

To tone, take of stock solution enough to tone in four-minute speed. Do not use too large a bath and tone a *few* at a time. Take chill off bath and it will tone much more rapidly and with more brilliancy. Always use a *fresh* bath. The more rapid the platinum bath the more brilliant your tones and better the blacks. Wash through three or four changes of water after platinum bath.

For platinum or olive tones clear the highlights and shadows of red. For blue black tone only slightly in the platinum bath to prevent prints *going back* in fixing.

Fixing Bath.

Water........	20 oz.
Sodium Hyposulphite	1 oz.
(Or Hydrometer test 18 degrees).	

SLOW BROMIDE OR DEVELOPING PAPERS.

General Directions.

Light.—The paper can be safely handled eight feet from the source of light, which may be Welsbach gas light, covered with post-office paper, incandescent light, ordinary gas light, kerosene light, or reduced daylight, the latter produced by covering a window with one or more thicknesses of orange post-office paper, as necessitated by strength of light.

Expose by holding the printing frame close to gas, lamp, or incandescent light, or to subdued daylight. Artificial light is recommended in preference to daylight because of uniformity, and it being in consequence easier to judge the proper length of time to expose.

Exposure.—The amount of exposure required varies with the strength of light; it takes about the same time with an ordinary gas burner, and an incandescent light; a Welsbach gas light requires only about one-half as much time as the ordinary gas burner, and a kerosene light of ordinary size about three times as much time as an ordinary gas burner. If daylight is to be used the window should be covered with post-office paper, in which a sub-window about one foot square for making the exposure may be made. Cover this window first with a piece of white tissue paper, then with a piece of black cloth or post-office paper to exclude the white light when not wanted. Make exposure according to strength of light at from one to two feet away from the tissue paper. Keep printing frame when artificial light is used constantly in motion during exposure.

Timing the Exposure.—Time necessary for exposing is regulated by density of negative and strength of light. The further away the negative is from the source of light at the time of exposure the weaker the light; hence, in order to secure uniformity in exposure it is desirable to always make exposure at a given distance from the light used. With a negative of medium density exposed one foot from ordinary gas burner, from one to ten minutes' exposure is required.

A test to ascertain the length of exposure should be made. Once the proper amount of exposure is ascertained with a given light, the amount of exposure required can be easily approximated by making subsequent exposures at the same distance from the same light, the only difference that it would then be necessary to make would be to allow for variation in density of different negatives.

Fixing.—Allow prints to remain in fixing solution ten to twenty minutes, when they should be removed to a tray containing clear water.

Washing.—Wash one hour in running water, or in ten or twelve changes of clear water, allowing prints to soak two to three minutes in each change.

CYKO PAPER.

Nearly any artificial light will do for exposing, although some are much slower than others. The Welshbach gas light is probably the most practical for ordinary work. Artificial light is preferable to daylight for exposing, as it is not so apt to vary.

Formula for Developer. We recommend the following as being the best for all-round work:

Water, soft or distilled	32 oz.
Metol	5 gr
Hydroquinone	60 gr.
Sulphite of sodium (dry, powdered)	1 oz.
Carbonate of sodium (dry, powdered)	¾ oz.
Potassium Bromide	4 gr.

Dissolve in the order named, and remember that while this amount of bromide is usually sufficient, it may at times be found that more of the bromide solution must be added as per developing directions. This developer is excellent for negatives if diluted with two parts of water.

Bromide Solution.

Bromide of potassium	1 oz.
Water	10 oz.

This solution will keep indefinitely.

Fixing Bath.

Hyposulphite of sodium	12 oz.
Water	64 oz.

For certainty of results, and to prevent staining and blisters, add the following acid hardener to the fixing bath:

Water	5 oz.
Sodium sulphite (powdered)	¼ oz.
Acetic acid (No. 8)	3 oz.
Alum (powdered)	½ oz.

The hardener keeps the bath perfectly clear. It can be made up in larger quantities and kept as a stock solution. This fixing bath is very fine for negatives.

METOL FORMULA FOR CYKO.

Giving greater detail and softness.

Water	16 oz.
Metol	60 gr.
Sulphite of soda, crystals	327 gr.
Carbonate of soda, granular	180 gr.
Ten per cent. bromide of potassium	30 drop.

Cyko Prints will dry of their own accord if placed face up, separately on blotting paper, and then covered with another sheet of blotter and *not* subjected to heavy pressure.

Before placing the prints between the blotters, pile them all, one on the other, face down on a sheet of glass; cover then with a blotter, and with a squeegee roller remove all superfluous moisture.

The prints when dry will have a slight tendency to curl, but can be made to lie flat by turning the print face downward on some smooth surface and then drawing a ruler over the back of the print with a slight pressure, lifting the print as the ruler passes over it. Care should be used not to bend any portion of the print too sharply, as by so doing you may crack the gelatine surface.

VINCO PLATINO-BROMIDE PAPER.

Metol-Hydro Developer.

600 c. cm.	Water	20 oz.
2 grms.	Metol	30 gr.
$\frac{2}{3}$ grm.	Hydrochinon	10 gr.
7 grms.	Sulphite soda gran	110 gr.
7 grms.	Carbonate soda gran	110 gr.
2-10 grms.	Potassium bromide	2 gr.

For Soft Detail Negatives, shorten exposure and use full strength; for vigorous negatives, dilute one-half with water. Lower the flame of lamp or gas to about one-half, take the exposed paper and draw through the developer face up, thus wetting front and back; if exposure is correct development will proceed uniformly and be completed in 30 to 60 seconds. To arrest development, place at once in following solution:

Short Stop and Hardener.

960 c. cm.	Water	32 oz.
30 grms.	Powdered alum	1 oz.
30 grms.	Table salt	1 oz.

30 to 60 seconds' immersion is sufficient; rinse and place in

Fixing Bath.

960 c. cm.	Water	32 oz.
4 c. cm.	Sulphuric acid	1 dr.
80 grms.	Sulphite of soda dry	1 oz.
240 grms.	Hyposulphite soda	8 oz.

To Stop Development Locally.—It frequently happens that landscape negatives have delicate detail in the shadows; to preserve them in the print, as soon as the image is out far enough in the shadows, remove from the developer, rub over the parts with a finger dipped in the *Short Stop*, or with a tuft of cotton wet with same. This will arrest development in those parts, while allowing the rest to proceed.

VELOX DEVELOPING PAPER.

Metol Quinol.

Water	10 oz.
Metol	7 gr.
Sodium sulphite, crystals pure	½ oz.
Hydroquinon	30 gr.
Sodium carbonate, desiccated, 200 gr. (or 400 gr. of crystalized carbonate).	
10 per cent. bromide of potassium solution	about 10 drops.

Amidol Formula.

Water	4 oz.
Sodium sulphite, crystals pure	200 gr.
Amidol	about 20 gr.
10 per cent. bromide of potassium solution	about 5 drops.

If black are greenish, add more amidol; if whites are grayish, add more bromide of potassium.

Hypo=Acid Fixing Bath.

Hypo	16 oz.
Water	64 oz.

Then add the following hardening solution:

Water	5 oz.
Sodium sulphite crystals	½ oz.
Commercial acetic acid (containing 25 per cent. pure acid)	3 oz.
Powdered alum	½ oz.

PLATINUM PAPERS.

GENERAL INSTRUCTIONS.

To secure the most brilliant results the sensitized paper, *before, during*, and *after* its exposure to light, must be kept as dry as possible.

The paper is exposed to daylight, in the printing frame, for about one-third of the time necessary for ordinary silver paper.

The print is then immersed in the developer for about 30 seconds, then cleared in three acid baths containing 1 part of muriatic acid C. P. to 60 parts of water, washed for a short time in running water. The whole operation of printing, clearing, and washing being complete in about half an hour:

As a general rule all parts of the picture except the highest lights should be visible when the exposure is complete.

When examining the prints in the printing frames, care should be taken not to expose them unduly to light; for the degradation of the whites of the paper due to *slight* action of light is *not visible until after development.*

ANSCO PLATINUM PAPER.

Print until a trace of the detail *desired* is slightly visible in the highlights.

Development.—Best results are obtained with the temperature of the developer from 60 to 80 degrees F. Immerse the paint in the developer with a quick sweeping motion to prevent air bells. Develop in artificial or weak daylight. The development of a print from a normal negative will require 40 seconds or more.

Formula for Developer.

Water	50 oz.
Neutral Oxalate of Potash	8 oz.
Potassium Phosphate (Monobasic)	1 oz.

Care must be used to obtain the Monobasic Potassium Phosphate.

Immediately after prints are developed, place them face down in the first acid bath, composed of

Muriatic Acid, C. P	1 oz.
Water	60 oz.

After remaining in this bath for a period of about five minutes, transfer to the second acid bath of the same strength. The prints should pass through at least three and preferably four acid baths, to remove all traces of iron that may remain in the pores of the paper.

When thoroughly cleared, the print should be washed from 10 to 20 minutes in running water. If running water is not available, several changes of water in the tray will be necessary.

"WATER TONE" PLATINUM PAPER.

"Water Tone" Platinum Paper is very easily affected by moisture; it will, therefore, be noticed when printing in warm, damp weather that the print will show quite a tendency to print out black in the deep shadows. This must not be taken into consideration, as the same amount of exposure is necessary as in dry days.

Print by direct light (sunlight preferred) until the shadows are clearly outlined *in a deep canary color*. At this stage the same detail will be observed in the half tones that the finished print will show. For developing, use plain water, heated to 120 degrees (which will be as hot as they can bear).

The development will be practically instantaneous, and care must be taken to avoid air bubbles forming upon the surface of the prints. Place prints, after developing, directly into a clearing bath of muriatic acid, one dram to twelve ounces of water, and let them remain in this bath about ten minutes, when they are ready for the final washing of fifteen minutes in running water, or five changes of about three minutes each. Lay out between blotters to dry and mount by attaching the corners.

BRADLEY PLATINUM PAPER.

Developer.

A. For Black Tones.

Neutral oxalate potassium	8 oz.
Phosphate potassium	1 oz.
Water	30 oz.

B. For Sepia Tones.

Of above mixed solution	8 oz.
Saturated bichloride mercury solution	1 oz.
Citrate soda	5 gr.

If deep red tones are desired add to B:

Nitrate uranium	10 gr.

then filter and use as a developer.

W. & C. PLATINOTYPE.

Development.—The whole contents of the box of the W. & C. developing salts must be dissolved at one time, as the salts are mixed; and if this be not done, too large a proportion of one of the ingredients may be used.

Development should be conducted in a feeble white light, similar to that used when cutting up the paper, or by gas light.

It may take place immediately after the print is exposed, or at the end of the day's printing.

Develop by floating the print, exposed side downwards, on the developing solution.

Development may take 30 seconds or more.

During the hot summer days it is not advisable to unduly delay the development of exposed prints. If possible develop within one hour after printing.

Either porcelain or agate—preferably porcelain—dishes are necessary to hold the developing solution.

To clear the developed prints: these must be washed in a series of baths (not less than three) of a weak solution of muriatic acid C. P. This solution is made by mixing one part of acid in 60 parts of water.

As soon as the print has been removed from the developing dish it must be *immersed face downwards* in the first bath of this acid, contained in a porcelain dish, in which it should remain about five minutes; meanwhile, other prints follow until all are developed. The prints must then be removed to a second acid-bath for about ten minutes; afterwards to the third bath for about fifteen minutes. While the prints remain in these acid-baths they should be moved so that the solution has free access to their surfaces, but care should be taken not to abrade them by undue friction,

Pure muriatic acid *must be used.*

If commercial muriatic acid be used, the prints will be discolored and turn yellow.

For each batch of prints fresh acid-baths must be used.

After the prints have passed through the acid-baths, they should be well washed in three changes of water during about a half hour. It is advisable to add a pinch of washing soda to the second washing water to neutralize any acid remaining in the print. Do not use water that contains iron, as it tends to turn paper yellow. Soft water is the best for this purpose.

W. & C. SEPIA PAPER.

With a few exceptions the method of carrying out the operations is the same as for the "black" kinds of platinotype paper. The *following points* should be attended to:

The "Sepia" paper is more easily affected by faint light, and, therefore, increased care must be taken when printing.

To develop, add to each ounce of the developing solution 1½ drachms of sepia solution supplied for this purpose, and proceed as described for black paper.

The solution must be heated to a temperature of 150 to 160 deg. Fahr., to obtain the greatest amount of brilliance and the warmest color, but very good results can be obtained by using a cooler developer.

VARIATIONS OF THE SEPIA DEVELOPER.

Primarily the object of the *sepia solution*, in the developer, is to increase the brightness of the prints, as, for example, when the negative is *thin* and *flat*, or *pense* and *flat*, the addition of the sepia solution to the developer clears up, to some extent, the flatness of the print by taking out traces of the finer detail in the higher lights, which is often a decided improvement. If, however, the negative be dense, with clear shadows, the sepia solution may be discarded altogether. This will prevent the loss of any of the finer detail and greatly reduce harshness in the prints. Sometimes a half, or even a quarter, of the quantity of the sepia solution recommended as an addition to the developer will be sufficient, depending altogether upon the strength of the negatives. Prints developed without the solution have less of the sepia quality but are very agreeable, nevertheless. It should be remembered that the sepia paper is totally different from the black, and will develop sepia tones on a developer to which *no sepia solution* has been added. The sepia solution clears up and brightens the flat, muddy (to some extent, not totally) effects from the thinner class of negatives.

THE GLYCERINE PROCESS.

The "Glycerine Process," or the process of developing platinotype prints by application of the developing agent with the brush, is perhaps one of the most interesting and fascinating of photographic processes, owing to its far reaching possibilities.

By this method of developing platinotype paper, many negatives, which have been discarded on account of the dim, flat, non-contrasty results which they yield, and, in the hands of one possessing a little artistic skill, snappy, animated pictures may be obtained. On the other hand, from the sharp and hard negative, soft, sketchy effects may be gotten.

There are required for this process: Some glass jars; some soft brushes, varying from the fine spotter and the Japanese brush to the 1½ inch duster, and several pieces of special blotting paper.

Operation.—Print the paper a trifle deeper than for the ordinary method of developing. Place the print face up on a piece of clean glass, (should the print curl so that it is unmanageable, moisten the glass with glycerine), and, with the broad camel's hair brush, thinly coat the entire print with pure glycerine, blotting same off in three or four seconds; then re-coat more thickly such portions as are desired especially restrained, or the details partly or entirely eliminated. Now brush or paint such portion of the print as is first desired with solution of one part glycerine and four parts normal developer, blotting the portion being developed from time to time to avoid developing too far. Full strength developer (without glycerine) is employed where a pronounced or deep shade is wanted.

When any part of the print has reached the full development desired, blot that portion carefully with the blotter and coat with pure glycerine.

A brown effect may be obtained by using saturated solution of mercury in the developer, (1 part mercury to 8 parts developer). By the use of diluted mercury the "flesh tones" are produced in portraits, etc.

When print has reached complete development, place in hydrochloric (muriatic) acid and wash as usual.

BLUE-PRINT FORMULAE.

No. 1.

Citrate of iron and ammonia	1⅞ oz.
Water	8 oz.

No. 2.

Ferricyanide of potassium	1¼ oz.
Water	8 oz.

Mix equal parts of No. 1 and No. 2, and apply with brush or by floating for three minutes. Plain Rives paper should be used; hang up to dry in darkened room.

Black Lines upon a White Ground.

Gelatine	8 dr.
Perchloride of iron solution (U. S. P.)	6 dr.
Tartaric acid	3 dr.
Ferric sulphate	3 dr.
Water	9 oz.

Filter off any precipitate that may be found, and coat any good, stout, white paper with the full-strength solution. Expose in sunlight till details or lines are visible, and develop with

Gallic acid	6 dr.
Alcohol	6½ oz.
Water	32 oz.

Wash well in several changes of water.

The sensitizing solution is as follows:

Gum arabic	15 gr.
Tartaric acid	2 gr.
Chloride of sodium (common salt)	9 gr.
Sulphate of iron	10 gr.
Iron perchloride	15 gr.
Water	110 c. c.

In mixing the solution, the gum arabic is first dissolved in the water by the aid of heat, and the other salts are added while the solution is still warm. The solution is spread over the surface of the paper with a sponge, and, after allowing a little time for it to penetrate the surface, all superfluous moisture is removed, using the sponge again, well wrung out.

Development is by a plain aqueous solution of gallic acid. After development the print is rapidly washed, when superfluous moisture is carefully sponged off the surface.

TO REMOVE STAINS FROM THE HANDS.

Development Stains.—Yield easily to the action of lemon juice.

Nitrate of Silver Stains.—Prepare a solution of water 100 cc.; chloride of lime, 25 grms.; sulphate of soda, 50 grms. Apply with a tooth-brush.

Pyro Stains.—Wash stained parts with a 10 per cent. solution of oxalic acid.

Amidol Stains.—Difficult to remove. Try citric acid.

Nitric Acid Stains.—Apply to stained parts a solution of permanganate of potash. Then wash freely.

ENLARGEMENTS.

From the British Journal of Photography Almanac.

Focus of Lens.	Times of Enlargement and Reduction.							
Inches.	**1** Inch.	**2** Inches	**3** Inches.	**4** Inches.	**5** Inches.	**6** Inches.	**7** Inches.	**8** Inches.
2................	4 4	6 3	8 2⅔	10 2½	12 2⅖	14 2⅓	16 2²⁄₇	18 2¼
2½................	5 5	7½ 3¾	10 3⅓	12½ 3⅛	15 3	17½ 2⁹⁄₁₀	20 2⁶⁄₇	22½ 2³⁄₁₆
3................	6 6	9 4½	12 4	15 3¾	18 3⅗	21 3½	24 3³⁄₇	27 3⅜
3½................	7 7	10½ 5¼	14 4⅔	17½ 4¾	21 4⅕	24½ 4¹⁄₁₂	28 4	31½ 3⁹⁄₁₆
4................	8 8	12 6	16 5⅓	20 5	24 4⅘	28 4⅔	32 4⁴⁄₇	36 4½
4½................	9 9	13½ 6¾	18 6	22½ 5⅗	27 5⅖	31½ 5¼	36 5¹⁄₇	40½ 5¹⁄₁₆
5................	10 10	15 7½	20 6⅔	25 6¼	30 6	35 5⅚	40 5⁵⁄₇	45 5⅝
5½................	11 11	16½ 8¼	22 7⅓	27½ 6⅘	33 6½	38½ 6⁵⁄₁₂	44 6²⁄₇	49½ 6³⁄₁₆
6................	12 12	18 9	24 8	30 7½	36 7⅕	42 7	48 6⁶⁄₇	54 6¾
7................	14 14	21 10½	28 9⅓	35 8¾	42 8⅖	49 8⅙	56 8	63 7⅞
8................	16 16	24 12	32 10⅔	40 10	48 9⅗	56 9⅓	64 9¹⁄₇	72 9
9................	18 18	27 13½	36 12	45 11¼	54 10⅘	63 10½	72 10²⁄₇	81 10⅛

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 in the first vertical column, and carry his eye to where these two join, which will be at 30 7½. The greater of these is the distance the sensitive plate must be from the 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.

Table of Symbols, Atomic Weight and Solubilities of the Principal Chemicals used in Photography.

Abbreviations.—s., soluble ; v. s., very soluble ; sp. s., sparingly soluble ; n. s., not soluble ; dec., decomposed ; del., deliquescent.

Name.	Symbol.	Molecular Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Acid, Acetic	$C_2H_4O_2$	60	in	any pro	portion.
" Boric or Boracic	H_3BO_3	62	25	3	6
" Carbolic (see Phenol)	C_8H_6O	94	16.6	3	6
" Citric	$C_6H_8O_7 + H_2O$	210	0.75	0.5	s.
" Digallic (see Tannin)	$C_{14}H_{10}O_9$	322	0.8	0.5	0.8
" Gallic	$C_7H_6O_5$	170	100	3	8
" Hydrobromic	HBr	81	s.	s.	s.
" Hydroiodic	HI	128	s.	s.	s.
" Hydrochloric	HCl	36.5	s.	s.	s.
" Hydrofluoric	HFl	20	s.	s.	s.
" Hydrocyanic	HCy or CN	27	s.	s.	s.
" Hydrosulphuric	H_2S	34	s.	s.	s.
" Muriatic (see Hydrochloric)					
" Nitric	HNO_3	63	in	all propor	tions.
" Nitrous	HNO_2	47	ab	sorbed.	
" Oxalic	$C_2H_2O_4 + 2H_2O$	126	8	0.2	s. also in ether
" Pyrogallic (see Pyrogallol)	$C_6H_6O_3$	126	2	v. s.	also v. s. in ether.
" Salicylic	$C_7H_6O_3$	138	7.6	9	also v. s. in ether.
" Sulphuric	H_2SO_4	98	in	any pro	portion.
" Sulphurous	H_2SO_3	82	ab	sorbed.	
" Tannic (see Digallic)					
" Tartaric	$C_4H_6O_6$	150	0.8	0.5	5
Alcohol, Ethyl	C_2H_8O	46	in	all propor	tions.

Alcohol, Methyl (see Wood Alcohol)	CH_4O	32	in	all proportions.	
Alum (see Potassium Aluminium Sulphate)	$Al_2(SO_4)_3K_2SO_4+24H_2O$	948.8	10	8	n. s.
Alum Chrome (see Potassium Chromic Sulph.)	$Cr_2(SO_4)_3K_2SO_4+24H_2O$	998.4	10	dec.	n. s.
Amidol (Diamido Phenol)	$C_6H_8N_2O$	124	very	soluble.	
Ammonia, Gaseous	NH_3	17	very	soluble.	
Ammonium Bichromate	$(NH_4)_2Cr_2O_7$	252	v. s.	v. s.	
" Bromide	NH_4Br	98	1.29	0.7	31.5
" Cadmium Bromide	$2NH_4Br2CdBr_2+H_2O$	678	0.73		5.3
" " Iodide	$2NH_4ICdI_2+2H_2O$	545	0 58		0.7
" Chloride	NH_4Cl	53.5	3	1	sp s.
" Ferric Oxalate	$Fe_2(C_2O_4)_6(NH_4)_6+8H_2O$	892	2.1	0.29	sp. s.
" Fluoride	NH_4Fl	37	v. s.	v. s.	sp. s.
" Iodide	NH_4I	145	1	0.5	s.
" Nitrate	NH_4NO_3	80	2	1	s.
" Oxalate	$(NH_4)_2C_2O_4$	124	4	2	s.
" Persulphate	$(NH_4)SO_4$				
" Sulpho-Cyanate	NH_4CNS	76	s.	s.	s.
Aurantia (Hexanitro-diphenylamin Ammonia)	$NH_4C_{12}H_4(NO_2)_6N$	456			
Aurin (Trioxy-triphenyl Carbinol)	$C_{19}H_{14}O_3$	290			
Barium Chloride	$BaCl_2+2H_2O$	244	2.18	1.5	sp. s.
" Nitrate	$Ba(NO_3)_2$	261	12.2	2.84	n. s.
" Per-oxide	BaO_2	169	v. s.	n. s.	n. s.
Benzole or Benzine (Trioxy-tryphenyl-Carbinol)	C_6H_6	78	n. s.	n. s.	s.
Borax (see Sodium Biborate)					
Cadmium Bromide	$CdBr_2+4H_2O$	344	1.5	1	sp. s.
" Iodide	CdI_2	366	1.5	1	s.
Calcium Bromide	$CaBr_2$	200	1	.75	s.
" Carbonate (see Chalk)	$CaCO_3$	100	n. s.	n. s.	n. s.
" Chloride	$CaCl_2+6H_2O$	219	.75	.5	10
" Hypochlorite (see Chloride of Lime)	$CaCl_2O_2CaCl_2$(?)	254	sp. s.	sp. s.	dec.
Calomel (see Mercurous Chloride)					
Camphor	$C_{10}H_{16}O$	152	1000		v. s.
Caustic Potash (see Potassium Hydrate)					
" Soda (see Sodium Hydrate)					
Chalk (see Calcium Carbonate)					

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Name.	Symbol.	Molecular Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water	Alcohol.
Chinoline Blue or Cyanine	$C_{29}H_{35}NaI$	533	sp. s.	sp. s.	s.
" Red	$C_{26}H_{19}NaCl$	389.5			
Chloride of Lime (see Calcium Hypochlorite)					
Chlorine	Cl	35.5	absorbed by 1 to 2.5 vols.		
Chloroform	$CHCl_3$	119.5	sp. s.	sp. s.	v. s.
Chrome Alum (see Alum Chrome)					
Copper Acetate (see Verdigris)	$Cu(C_3H_3O_2)_2 + H_2O$	223.4	14	5	1 in 14
" Bromide	$CuBr_2$	223.4	1	.75	s.
" Chloride	$CuCl_2 + H_2O$	152.4	1	.75	v. s.
" Sulphate (see Blue Vitriol)	$CuSO_4 + 5H_2O$	249.4	3	1	n. s.
" " and Ammonia	$CuSO_4 + 4NH_3 + H_2O$	245.4	s.	v. s.	n. s.
Corrosive Sublimate (see Mercuric Chloride)					
Dextrine	$C_6H_{10}O_5$	162	easily s.		n. s.
Eikonogen (Amido-β-Naphthol-β-Monosulphonate of Sodium)	$C_{10}H_8SO_4NaN$	261	40	e. s.	s.
Eosine, Yellow Shade (Tetra Bromo-fluorescein Potassium)	$C_{20}H_6Br_4O_5K_2$	724	s.	s.	s.
Eosine, Red Shade (Tetra Brom.-fluores. Sod.)	$C_{20}H_6Br_4O_5Na_2$	692	s.	s.	s.
Epsom Salt (see Magnesium Sulphate)					
Erythrosine M. (Tetra Iodo-fluoresceine Potassium or Sodium)	$C_{20}H_6I_4O_5K_2$ or Na_2	912 or 880	s.	s.	s.
Erythrosine G. (Di-iodo-fluoresceine Potassium or Sodium)	$C_{20}H_6I_2O_5K_2$ or Na_2	658 or 626	s.	s.	s.

Gelatine, Glutine	Unobtainable		sp. s.	e. s.	n. s.
Glycerine	$C_3H_8O_3$	92	in all proportions.		
Glycine (Oxy-phenylglycine)	$C_8H_9O_3N$	162			
Gold, Neutral Chloride	$AuCl_3$	302.5	1	5	also in ether.
" and Cadmium Chloride	$AuCl_5Cd$	485.5	s.	s.	s.
" and Potassium Chloride	$AuCl_4K+5H_2O$	467	s.	s.	s.
" and Sodium Chloride	$AuCl_4Na+2H_2O$	397	s.	s.	s.
" Sodium Hyposulphite	$AuNa_3S_4O_6+2H_2O$	525	s.	s.	s.
Gun Cotton (Tetra-nitrate Cellulose)	$C_{12}H_{16}O_6(NO_3)_4$	504	n. s.	n. s.	in ether
" " (Tri-nitrate Cellulose)	$C_{10}H_{17}O_7(NO_6)_3$	579	n. s.	n. s.	alcohol
Hydrochinone	$C_6H_6O_2$	110	s.	s.	also in ether.
Hydroxylamine Hydrochlorate	NH_3OHCl	69.5	0.6	e. s.	4
Iodine	I	127	sp. s.	sp. s.	e. s.
Iridium Tetra Chloride	$IrCl_4$	335			
Iron, Ammonium Sulphate	$FeSO_4(NH_4)_2SO_4+6H_2O$	392	v. s.	dec.	n. s.
" Chloride (Ferric)	Fe_2Cl_6	325	.75	.5	1 in 1
" Chloride (Ferrous)	Fe_2Cl_2	127	2	1	1 in 1
" Citrate	$Fe_2(C_6H_5O_7)_2$	490	s.	s.	n. s.
" Citrate and Ammonium	$Fe_2(C_6H_5O_7)_2+(NH_4)_3$	544	s.	s.	sp. s.
" Iodide	FeI_2+4H_2O	382	v. s.	v. s.	v. s.
" Nitrate	$Fe(NO_3)_2+6H_2O$	288	v. s.	dec.	dec.
" Oxalate (Ferric)	$Fe_2(C_2O_4)_3$	376	s.	s.	n. s.
" " (Ferrous)	FeC_2O_4	144	in potassium oxal.		n. s.
" Sulphate (Ferric)	$Fe_2(SO_4)_3+9H_2O$	566	s.	dec.	s.
" " (Ferrous)	$FeSO_4+7H_2O$	278	1.5	1	n. s.
Kaoline	$Al_2Si_2O_7+2H_2O$	258.8	not soluble.		
Lead, Acetate (see Sugar of Lead)	$Pb(C_2H_3O_2)_2$	325	2.5	2	1 in 12.5
" Carbonate	$PbCO_3$	267	n. s.	sp. s.	n. s.
" Iodide	PbI_2	461	s.	s.	n. s.
" Nitrate	$Pb(NO_3)_2$	331	7.7	7	s.
" Oxide	PbO	223	n. s.	n. s.	Alkalis.
Lithium, Bromide	$LiBr$	87	.66	.5	v. s.
" Chloride	$LiCl+H_2O$	60.5	1.3	1	s.
" Iodide	$LiI+3H_2O$	188	.61	.5	s.
Magnesium, Bromide	$MgBr_2$	184.4	1	.75	s.

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Magnesium, Chloride	$MgCl_2$	95.4	2	1.5	s.
" Iodide	MgI_2	278.4	1	.75	v. s.
" Sulphate (see Epsom Salt	$MgSO_4,7H_2O$	246.4	1.3	1	sp. s.
Manganous Chloride	$MnCl_2+4H_2O$	198	s.	s.	n. s.
Mercury, Chloride (Mercuric) (see Corr. Subl)	$HgCl_2$	271	19	3	5
" " (Mercurous) (see Calomel)	Hg_2Cl_2	471	n. s.	n. s.	n. s.
" Cyanide	$HgCy_2$ or $(CN)_2$	252	8	2	1 in 20
" Iodide (Mercuric)	HgI_2	454	sp. s.	sp. s.	sp. s.
" " (Mercurous)	Hg_2I_2	654	n. s.	n. s.	n. s.
Metol (Mono-methyl Para-amidometakresol)	$C_8H_{11}NO$	137	s.	s.	s.
Para-amidophenol	C_6H_7NO	109	sp. s.	s.	....
Para-amidophenol Sodium	C_6H_6NaNO	131	easily	soluble.	....
Para-amidophenol Hydrochlorate	C_6H_7NOHCl	145.5	s.	s.	s.
Para-rosaniline (Triamido-phenyl-Carbinol)	$C_{19}H_{19}N_3O$	305	....	....	....
Phenol (see Carbolic Acid)	....	....	....	....	....
Platino-potassium Chloride or Chloro-platinite	K_2PtCl_4	417.4	6.	....	s.
Platino-sodium Chloride or Chloro-platinite of Sodium	Na_2PtCl_4	385.4	solu	ble.	....
Platinum Chloride	$PtCl_4+5H_2O$	429.4	....	*	....
Potassa (see Potassium Hydrate)	....	....	....	....	....

* Real platinum-chloride is but little soluble in water ; the article of commerce of that name answers to the formula $PtCl_42HCl+6H_2O$, and is of the atomic weight 520.4 (K. Schwier). It is easily soluble in water, probably in the proportion of 1.6.

Potassium, Aluminium Sulphate (see Alum)	...	...	...	...	...
" Bicarbonate	$KHCO_3$	100	3	2	n. s
" Bichromate	$K_2Cr_2O_7$	294.4	10	7	n. s.
" Bromide	KBr	119	2	1	1 in 90
" Carbonate	K_2CO_3	138	.75	.5	n. s.
" Chlorate	$KClO_3$	122.5	16	2	n. s.
" Chloride	KCl	74.5	3	2	sp. s.
" Chromic Sulph. (see Chrome Alum)	...	...	...	...	...
" Citrate	$K_3C_6H_7O_8$	324	6.6	.3	n. s.
" Cyanide	KCy or (CN)	65	1	.5	sp. s.
" Ferric Sulphate	$K_2SO_4 + Fe_2(SO_4)_3 + 24H_2O$	957	s.	s.	n. s.
" Ferri-cyanide (see Red Prussiate)	K_3FeCy_6	329.3	2.5	1.2	n. s.
" Ferro-cyanide (see Yellow Pruss.)	$K_4FeCy_6 + 3H_2O$	422	3	1	n. s.
" Fluoride	KFl	58	v. s.	v. s.	v. s.
" Hydrate	KOH	56	.5	.25	sp. s.
" Iodide	KI	166	.75	.5	1 in 16
" Nitrate (see Saltpetre)	KNO_3	101	4	1	n. s.
" Oxalate	$K_2C_2O_4 + 2H_2O$	202	3	2	sp. s.
" Permanganate	$KMnO_4$	158	16	10	n. s.
" Sulpho-cyanate	$KCyS$	97	2	1	sp. s.
Pyrogallol (see Pyrogallic Acid)	...	...	...	...	...
Rhodan (German appellation for Cyanates)	...	...	...	...	...
Rodinal (ready-prepared Para-amido Devel.)	...	...	...	...	...
Silver, Acetate	$AgC_2H_3O_2$	167	sp. s.	sp. s.	n. s.
" Bromide	$AgBr$	188	n. s.	n. s.	in HCl and HBr.
" Carbonate	Ag_2CO_3	276	n. s.	n. s.	n. s.
" Chloride	$AgCl$	143.5	n. s.	n. s.	Ammonia. cyan. potass. hyposulphite of soda.
" Citrate	$Ag_3C_6H_5O_7$	513	sp. s.	sp. s.	...
" Fluoride	$AgFl$	127	v. s.	v. s.	v. s.
" Iodide	AgI	235.	n. s.	n. s.	same as Chloride.
" Nitrate	$AgNO_3$	170	1	.5	sp. s.

Table of Symbols, Atomic Weight and Solubilities of the Principal Chemicals used in Photography.

Abbreviations.—s., soluble ; v. s., very soluble ; sp. s., sparingly soluble ; n. s., not soluble ; dec., decomposed ; del., deliquescent.

Name.	Symbol.	Molecular Weight.	One Part is Soluble in Cold Water	One Part is Soluble in Hot Water.	Alcohol.
Silver, Nitrite	$AgNO_2$	154	300	dec.	n. s.
" Oxalate	$Ag_2C_2O_4$	302	sp. s.	s.	n. s.
" Oxide	Ag_2O	232	n. s.	n. s.	n. s.
" Sulphide	Ag_2S	248	n. s.	n. s.	n. s.
Soda, Caustic (see Sodium Hydrate)					
Sodium Acetate	$NaC_2H_3O_2+3H_2O$	136	3	.66	n. s.
" Biborate (Borax)	$Na_2B_4O_7+10H_2O$	382	12.5	2	n. s.
" Bromide	$NaBr$	103	1.25	1	1.16
" Bicarbonate	$NaHCO_3$	84	12	dec.	n. s.
" Carbonate	$Na_2CO_3+10H_2O$	286	2	1	n. s.
" Chloride	$NaCl$	58.5	2.75	2.75	n. s.
" Citrate	$Na_3C_6H_5O_7$	258	1	.5	sp. s.
" Hydrate	$NaHO$	40	1.5	.5	sp. s.
" Hypo-sulphite	$Na_2S_2O_3+5H_2O$	248	1.5	1	sp. s.
" Iodide	NaI	150	.5	.3	sp. s.
" Nitrate	$NaNO_3$	85	1.36	1	1 in 37
" Sulph-antimoniate or Schlippe's Salt	Na_3SbS_4	317	s.	s.	n. s.
" Sulphate	$Na_2SO_4+10H_2O$	322	2	4	s.
" Sulphide	Na_2S+9H_2O	240	s.	s.	sp. s.
" Sulphite	$Na_2SO_3+7H_2O$	252	4	2	sp. s.
" Tungstate	$Na_2WO_4+2H_2O$	330	s.	s.	n. s.
" Thio-sulphate (see Hypo-sulphite)					
Strontium, Bromide	$SrBr_2+6H_2O$	355.5	1	.75	sp. s.
" Chloride	$SrCl_2+6H_2O$	266.5	1.8	1	sp. s.

Strontium, Nitrate	$Sr(NO_3)_2$	211.5	5	2	sp. s.
Sugar of Lead (see Lead Acetate)					
Tannin (see Digallic Acid)					
Thymol	$C_6H_3(CH_3(C_3H_7)COO$	177	sp.		and in ether.
Tin, Chloride (Stannic)	$SnCl_4$	260	dec.	in much	water.
" Chloride (Stannous)	$SNCl_2+2H_2O$	225	135:100	655:100	v. s.
Uranium, Bromide	UBr_2+4H_2O	472	1	.5	sp. s.
" Nitrate	$UO_2(NO_3)_2+6H_2O$	504	.5	.25	v. s.
" Sulphate	$UO_2SO_4+3H_2O$	422	.5	.25	v. s.
Verdigris (see Copper Acetate)					
Vitriol, Blue (see Copper Sulphate)					
" Green (see Iron Sulphate)					
" White (see Zinc Sulphate)					
Water	H_2O	18			
Washing Soda (see Sodium Carbonate)					
Wood Alcohol (see Alcohol Methyl)					
Zinc, Bromide	$ZnBr_2$	225	del.	and e. s.	s.
" Chloride	$ZnCl_2$	136	.33		s.
" Iodide	ZnI_2	319	.33	dec.	v. s.
" Nitrate	$Zn(NO_3)_2+6H_2O$	297	del.	del.	del.
" Sulphate (see White Vitriol)	$ZnSO_4+7H_2O$	287	2	1	n. s.
Zircon Earth	ZrO_2	122	n. s.	n. s.	n. s.

Table of the Symbols, Classes or Groups, Atomic and Equivalent Weights of the Elements.

Name.	Symbol.	Group.	Atomic Weight.	Equivalent Weight.
Aluminum	Al	III (IV)	27.4	13.7
Antimony (Stibium)	Sb	III (V)	120.0	120.0
Arsen	As	III (V)	75.0	75.0
Barium	Ba	II	137.0	68.5
Berryllium (Glucinum)	Be	II or III	9.4	4.7
Bismuth	Bi	III (V)	208.0	208.0
Boron	B	III (V)	11.0	11.0
Bromine	Br	I (III, V, VII)	80.0	80.0
Carbon	C	IV	12.0	6.0
Cadmium	Cd	II	112.0	56.0
Caesium	Cs	I	133.0	133.0
Calcium	Ca	II	40.0	20.0
Cerium	Ce	III (IV)	140 0	46.0
Chlorine	Cl	I (III, V, VII)	35.5	35.5
Chromium	Cr	IV (VI)	52.2	26.1
Cobalt	Co	II (IV)	58.8	29.4
Copper	Cu	II	63.4	31.7
Didymium	Di	III	145.0	
Erbium	E	III	166.0	
Fluorine	F	I	19.0	19.0
Gallium	Ga	IV	69.0	
Germanium	Ge	IV	72.2	
Glucinum	G	II	9.4	9.4
Gold	Au	I (III)	196.0	196.0
Hydrogen	H	I	1.00	1.00
Indium	In	III (IV?)	113.4	37.8
Iodine	I	I, III, V, VII	127.0	127.0
Iridium	Ir	II (IV, VI)	193.0	99.0
Iron	Fe	II (IV, VI)	56.0	28.0
Lanthanium	La	III	138.5	46.3
Lead (Plumbum)	Pb	II (IV)	207.0	103.5
Lithium	Li	I	7.0	7.0
Magnesium	Mg	II	24.4	12.2
Manganese	Mn	II (IV, VI, VII)	55.0	27.5
Mercury	Hg	II	200.0	100.0
Molybdenum	Mo	VI	96.0	46.0

Table of the Symbols, Etc.—*Continued.*

Name.	Symbol.	Group.	Atomic Weight.	Equivalent Weight.
Niobium (Columbium)............	Nb	V	94 0	18.8
Nickel	Ni	II (IV)	58.8	29.4
Nitrogen..........................	N	III (V)	14.0	14 0
Osmium...........................	Os	II (IV,VI,VII)	199.0	99.5
Oxygen............................	O	II (IV?)	16.0	8.0
Palladium.........................	Pd	(II, IV, VI)	106.0	53.25
Phosphorus........................	P	III (V)	31.0	31.0
Platinum..........................	Pt	II (IV, VI)	196.0	98.7
Potassium (Kalium)...............	K	I	39.0	39 0
Rhodium...........................	Rh	II (VI)	103.5	52.2
Rubidium..........................	Rb	I (V)	85.4	85.4
Ruthenium	Ru	II (IV,VI,VIII)	101.4	52.2
Scandium..........................	Sc	II (IV,VI,VIII)	43.9	52.2
Selenium..........................	Se	II (IV, VI)	79.0	39.7
Silicon (Silicium).................	Si	IV	28.0	14.0
Silver (Argentum)................	Ag	I	108.0	108.0
Sodium (Natrium).................	Na	I	23.0	23.0
Strontium.........................	Sr	II	87.5	43.7
Sulphur...........................	S	II (IV, VI)	32.0	16.0
Tantalum..........................	Ta	V	182.0	36.4
Tellurium.........................	Te	II (IV, VI)	127.0	64.0
Thallium..........................	Tl	I (III)	204.0	204.0
Thorium...........................	Th	IV	232.5	57.87
Tin (Stannum)....................	Sn	II, IV	118.0	59.0
Tugsten (Wolfram)................	W	IV, VI	184.0	92.0
Uranium	U	VI (IV)	240.0	60.0
Vanadium	V	III (V)	51.2	51.2
Ytterbium.........................	Yt	IV	172.6	17.1
Yttrium...........................	Y	II	89.5	30.85
Zinc	Zn	II	65 0	32.5
Zirconium	Zr	IV	90.0	14.8

Relative Brilliancy of Artificial Lights.

No.		1	2	3	4	5	6	7	8	9
1	Sun at Midday, June 21,—1	1	.....	.....	.....	.....	.....	.....	.....	.....
2	Light of Magnesium Lamp (burning 1 gram of powder)	3	1	.....	.....	.....	.....	.....	.....	.....
3	Magnesium Ribbon, 3 mm. wide	14	5	1	.....	.....	.....	.....	.....	.....
4	Electric Arc Lamp	35	11	2.5	1	.....	.....	.....	.....	.....
5	Oxyhydrogen Light	50	16	3.6	1.4	1	.....	.....	.....	.....
6	Gas, Welsbach System	165	53	11	7	10	1	.....	.....	.....
7	Incandescent Electric Lamp, (24 volts)	1,600	533	115	46	32	10	1	.....	.....
8	Oil of Petroleum Lamp	2,300	766	165	66	46	14	1.4	1	.....
9	Stearine Candle	18,000	6,000	1,300	515	360	109	11	7	1

By means of this table, the nine chief sources of light above given can be compared with each other as to their relative brilliancy.

Example.—Compared with the sun, the Welsbach Gas Light is 165 less brilliant, but is 10 times more brilliant than the electric incandescent lamp, and 109 more brilliant than the light from a stearine candle.

Elsden's Table of Poisons and Antidotes.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Vegetable Acids.	Oxalic Acid. including Potassium Oxalate.	1 dram is the smallest fatal dose known.	Hot, burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting or magnesia, suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	Ammonia. Potash. Soda.	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	Mercuric Chloride.	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	Acetate of Lead.	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	Cyanide of Potassium.	*a*. Taken internally, 3 grs. fatal.	Insensibility, slow, gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	Bichromate of Potassium	*a*. Taken internally. *b*. Applied to slight abrasions of the skin.	Irritant pain in stomach, and vomiting. Produces troublesome sores and ulcers.	Emetics and magnesia, or chalk.
	Nitrate of Silver.		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	Nitric Acid.	2 drams have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	Hydrochloric Acid.	½ ounce has caused death.		
	Sulphuric Acid.	1 dram has been fatal.		
	Acetic Acid, concentrated, has as powerful an effect as the mineral acids.			
	Iodine.	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot and starch given freely.
	Ether.	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
	Pyrogallol.	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

PASTE THIS TABLE UP IN YOUR WORKROOM.

Treatment of Residues.

Nature of Waste.	Treatment.	Result of Operation.	Extraction of Precious Metal.
Old hypo and fixing baths.	Add a small quantity of a strong solution of potassium sulphide, and silver will be precipitated in the form of a dense brown flocculent cloud; which stir, and allow to settle.	Collect the resulting precipitate of sulphide of silver, and allow to dry.	Mix with equal weight of sodium carbonate, 2 parts, potassium nitrate, 1 part, and fuse in a crucible.
Solid residues (cuttings of silver paper, old filters, etc.).	Burn.	Collect the ashes.	Mix with equal weight of sodium carbonate, 2 parts, potassium nitrate, 1 part, and fuse in a crucible.
Old combined toning and fixing sulpho-cyanide baths.	Add a small quantity of hydrochloric acid and ferrous sulphate, which give a precipitate of metallic gold mixed with hydrous perchloride of iron.	Collect, and dry.	Fuse in a crucible to collect the gold and silver.
Old platinotype baths (oxalate of potassium).	Add to each liter (1,000 cc.) of old oxalate bath, 330 cc. of a concentrated solution of sulphate of iron, and heat to boiling point.	The resulting black precipitate is pure platinum.	Collect, wash well, and dry on a filter.
Acid fixing baths (platinotype process).	Add ferrous developing solution.	Metallic platinum is formed (mixed with small quantity of iron.	Eliminate the iron by treating with sulphuric acid, then wash.
Silver from sensitive films.	Place sensitized plates, etc., in 100 cc. of hydrochloric acid; pour the whole into a beaker, and add 100 cc. of sulphuric acid, and heat.	Silver forms at the bottom of the beaker; allow to settle, and decant.	The residue is mixed with 5 parts of charcoal and 70 parts of sawdust, and heated to bright red in a crucible for an hour. A button of silver will be found at the bottom after the operation.

Characteristics of the Principal Photographic Developers.

Developer.	Color of Image.	Solubility.	Quantity Used in 1,000 c.c. of Water.	Used With.	Keeping Qualities.
Amidol.	Gray-black.	Soluble in water. Slightly soluble in alcohol.	5 grms.	Neutral sulphite soda and other alkalies.	Loses energy when it turns red
Pyrocatechin (Kachin).	Bluish-gray.	Soluble in water, alcohol, and ether.	5 to 15 grms.	Alkaline carbonates.	Slowly turns brown.
Eikonogen.	Gray-blue.	Soluble in warm water. Very soluble in cold water. Almost insoluble in alcohol or ether.	10 to 30 grms.	Neutral sulphite with alkaline carbonates.	Turns brown when exposed to the air without losing its energy.
Glycin.		Very soluble in water and alcohol. Insoluble in ether.		Caustic alkalies and carbonates.	
Hydroquinon.	Brown-black.	Very soluble in warm water, alcohol and ether; less soluble in cold.	7 to 10 grms.	Caustic alkalies and carbonates.	Turns brown when exposed to the air without losing its energy.
Metol.	Gray-black.	Very soluble in water. Soluble in alcohol and ether.	5 grms.	Alkaline carbonates.	Keeps well.
Ortol.		Very soluble in water. Soluble in alcohol and ether.		Alkaline carbonates.	
Paramidophenol.	Bluish.	Very soluble in water. Slightly soluble in alcohol and ether.	10 to 25 grms.	Carbonates and caustic alkalies.	Keeps well
Pyrogallic Acid.	Brown-yellow.	Very soluble in water, alcohol and ether.	5 to 10 grms.	Carbonates and ammonia.	Turns brown in the air.
Ferrous sulphate.	Yellowish.	Very soluble in water. Insoluble in alcohol.	100 to 300 grms.	Carbonates and ammonia.	Does not keep well.

United States Weights and Measures.

ACCORDING TO EXISTING STANDARDS.

LINEAL.

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.		Mile.
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. yard.
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 =	5760 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.

$27\frac{11}{32}$ Grains	= 1 Drachm =	$27\frac{11}{32}$ Grains.
16 Drachms	= 1 Ounce =	$437\frac{1}{2}$ Grains.
16 Ounces	= 1 Pound =	7000 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 =	5760 Grains.

NOTE.—An ounce of metallic silver contains 480 grains, but an ounce of nitrate of silver contains only $437\frac{1}{2}$ 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.		
1 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 $2\frac{1}{8}$ 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	=	$15\frac{2}{5}$ grains.			
2 grams	=	$30\frac{4}{5}$ "			
3 "	=	$46\frac{1}{5}$ "			
4 "	=	$61\frac{4}{5}$ "	.... or	1 dram	$1\frac{4}{5}$ grain.
5 "	=	$77\frac{1}{5}$ "	.... "	1 "	$17\frac{1}{5}$ grains.
6 "	=	$92\frac{3}{5}$ "	.... "	1 "	$32\frac{3}{5}$ "
7 "	=	108 "	.... "	1 "	48 "
8 "	=	$123\frac{2}{5}$ "	.... "	2 drams	$3\frac{2}{5}$ "
9 "	=	$138\frac{4}{5}$ "	.... "	2 "	$18\frac{4}{5}$ "
10 "	=	$154\frac{2}{5}$ "	.... "	2 "	$34\frac{2}{5}$ "
11 "	=	$169\frac{4}{5}$ "	.... "	2 "	$49\frac{4}{5}$ "
12 "	=	$185\frac{1}{5}$ "	.... "	3 "	$5\frac{1}{5}$ "
13 "	=	$200\frac{3}{5}$ "	.... "	3 "	$20\frac{3}{5}$ "
14 "	=	216 "	.... "	3 "	36 "
15 "	=	$231\frac{2}{5}$ "	.... "	3 "	$51\frac{2}{5}$ "
16 "	=	247 "	.... "	4 "	7 "
17 "	=	$262\frac{2}{5}$ "	.... "	4 "	2[illegible]$\frac{2}{5}$ "
18 "	=	$277\frac{4}{5}$ "	.... "	4 "	$37\frac{4}{5}$ "
19 "	=	$293\frac{1}{5}$ "	.... "	4 "	$53\frac{1}{5}$ "
20 "	=	$308\frac{3}{5}$ "	.... "	5 "	$8\frac{3}{5}$ "
30 "	=	463 "	.... "	7 "	43 "
40 "	=	$617\frac{1}{5}$ "	.... "	10 "	$17\frac{1}{5}$ "
50 "	=	$771\frac{3}{5}$ "	.... "	12 "	$51\frac{3}{5}$ "
60 "	=	926 "	.... "	15 "	26 "
70 "	=	$1080\frac{1}{5}$ "	.... "	18 "	$0\frac{1}{5}$ "
80 "	=	$1234\frac{3}{5}$ "	.... "	20 "	$34\frac{3}{5}$ "
90 "	=	1389 "	.... "	23 "	9 "
100 "	=	$1543\frac{1}{5}$ "	.... "	25 "	$43\frac{1}{5}$ "
1000 "	=	1 kilogram = 32 oz., 1 dr., $12\frac{2}{5}$ gr.			

Table Showing the Comparison of the Readings of Thermometers.

Celsius, or Centigrade (C). Réaumur (R). Fahrenheit (F).

C.	R.	F.	C.	R.	F.
—30	—24.0	—22.0	23	18.4	73.4
—25	—20.0	—13.0	24	19.2	75.2
—20	—16.0	— 4.0	25	20.0	77.0
—15	—12.0	+ 5 0	26	20.8	78.8
—10	— 8.0	14.0	27	21.6	80.6
— 5	— 4.0	23.0	28	22.4	82.4
— 4	— 3.2	24.8	29	23.2	84.2
— 3	— 2.4	26.6	30	24.0	86.0
— 2	— 1.6	28.4	31	24.8	87.8
— 1	— 0.8	30.2	32	25.6	89.6
			33	26.4	91.4
Freezing point of water.			34	27.2	93.2
			35	28.0	95.0
0	0.0	32.0	36	28.8	96.8
1	0.8	33.8	37	29.6	98.6
2	1.6	35.6	38	30.4	100.4
3	2.4	37.4	39	31.2	102.2
4	3.2	39.2	40	32.0	104.0
5	4.0	41.0	41	32.8	105.8
6	4.8	42.8	42	33.6	107.6
7	5.6	44.6	43	34.4	109.4
8	6.4	46.4	44	35.2	111.2
9	7.2	48.2	45	36.0	113.0
10	8.0	50.0	50	40.0	122.0
11	8.8	51.8	55	44.0	131.0
12	9.6	53.6	60	48.0	140.0
13	10.4	55.4	65	52.0	149.0
14	11.2	57.2	70	56.0	158.0
15	12.0	59.0	75	60.0	167.0
16	12.8	60.8	80	64.0	176.0
17	13.6	62.6	85	68.0	185.0
18	14.4	64.4	90	72.0	194.0
19	15.2	66.2	95	76.0	203.0
20	16.0	68.0	100	80.0	212.0
21	16.8	69.8			
22	17.6	71.6	Boiling point of water.		

Readings on one scale can be changed into another by the following formulæ, in which t° indicates degrees of temperature:

Réau. to Fahr.

$$\frac{9}{4}t^\circ \text{ R} + 32^\circ = t^\circ \text{ F}$$

Cent. to Fahr.

$$\frac{9}{5}t^\circ \text{ C} + 32^\circ = t^\circ \text{ F}$$

Fahr. to Cent.

$$\frac{5}{9}\left(t^\circ \text{ F} - 32^\circ\right) = t^\circ \text{ C}$$

Réau. to Cent.

$$\frac{5}{4}t^\circ \text{ R} = t^\circ \text{ C}$$

Cent. to Réau.

$$\frac{4}{5}t^\circ \text{ C} = t^\circ \text{ R}$$

Fahr. to Réau.

$$\frac{4}{9}\left(t^\circ \text{ F} - 32\right) = t^\circ \text{ R}$$

"Uniform System" Numbers for Stops from $\frac{f}{1}$ to $\frac{f}{100}$.

In the following table Mr. S. A. Warburton has 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.
1	1/16
1¼	.097
1.414	⅛
1½	.140
1¾	.191
2	¼
2¼	.316
2½	.390
2.828	½
2¾	.472
3	.562
3¼	.660
3½	.765
3¾	.878
4	1.00
4¼	1.12
4½	1.26
4¾	1.41
5	1.56
5¼	1.72
5½	1.89
5.656	2
5¾	2.06
6	2.25
6¼	2.44
6½	2.64
6¾	2.84
7	3.06
7¼	3.28
7½	3.51
7¾	3.75
8	4
8¼	4.25
8½	4.51
8¾	4.78
9	5.06
9¼	5.34
9½	5.64
9¾	5.94
10	6.25
11	7.56
11.31	8
12	9.00
13	10.56
14	12.25

f	U. S. No.
15	14.06
16	16
17	18.06
18	20.25
19	22.56
20	25.00
21	27.56
22	30.25
22.62	32
23	33.06
24	36.00
25	39.06
26	42.25
27	45.56
28	49.00
29	52.56
30	56.25
31	60.06
32	64
33	68.06
34	72.25
35	76.56
36	81.00
37	85.56
38	90.25
39	95.06
40	100.00
41	105.06
42	110.25
43	115.56
44	121.00
45	126.56
45.25	128
46	132.25
47	138.06
48	144.00
49	150.06
50	156.25
51	162.56
52	169.00
53	175.56
54	182.25
55	189.06
56	196.00
57	203.06

f	U. S. No.
58	210.25
59	217.56
60	225.00
61	232.56
62	240.25
63	248.06
64	256
65	264.06
66	272.25
67	280.56
68	289.00
69	297.56
70	306.25
71	315.06
72	324.00
73	333.06
74	342.25
75	351.56
76	361.00
77	370.56
78	380.25
79	390.06
80	400.00
81	410.06
82	420.25
83	430.56
84	440.00
85	451.56
86	462.25
87	473.06
88	484.00
89	495.06
90	506.25
90.50	512
91	517.56
92	529.00
93	540.56
94	552.25
95	564.06
96	576.00
97	588.06
98	600.25
99	612.56
100	625.00

Comparative Exposures of Various Subjects.

	Seconds.
Open panorama, with fields and trees	1
Snow, ice, marine views	1
Panorama, with houses, etc.	2
Banks of rivers	3
Groups and portraits in open air (diffused light)	6
Underneath open trees	6
Groups under cover	10
Beneath dense trees	10
Ravines, excavations	10
Portraits in light interiors	10
Portraits taken 4 feet from a window, indoors, diffused light	30

A Table Showing the Correct Exposure that Should be Given for Various Moving Objects.

By W. D. Kilbey.

The table is made out for a distance from the camera 100 times that of the focus of the lens; that is, for a 6-inch focus lens at 50 feet, a 7-inch at 58 feet, an 8-inch at 67 feet, a 9-inch at 75 feet, or 12-inch at 100 feet.

	Towards the Camera.	At Right Angles to the Camera.
Man walking slowly, street scenes	$\frac{1}{15}$ sec.	$\frac{1}{45}$ sec.
Cattle grazing	$\frac{1}{15}$ "	$\frac{1}{45}$ "
Boating	$\frac{1}{20}$ "	$\frac{1}{60}$ "
Man walking, children playing, etc.	$\frac{1}{40}$ "	$\frac{1}{120}$ "
Pony and trap, trotting	$\frac{1}{100}$ "	$\frac{1}{300}$ "
Cycling, ordinary	$\frac{1}{100}$ "	$\frac{1}{300}$ "
Man running a race and jumping	$\frac{1}{150}$ "	$\frac{1}{450}$ "
Cycle racing	$\frac{1}{200}$ "	$\frac{1}{600}$ "
Horses galloping	$\frac{1}{200}$ "	$\frac{1}{600}$ "

If the object is twice the distance, the length of allowable exposure is doubled, and *vice versa.*

Freezing Mixtures.

PARTS. Reducing the Temperature	From Degrees of the Celsius	To Thermometer
3 Nitrate of sodium + 4 Water	+13.2 deg.	— 5.3 deg.
9 Phosphate of sodium + 4 dilute Nitric acid	+10 "	— 9 "
3 Sulphate of sodium + 2 dilute Nitric acid	+10 "	—10 "
1 Nitrate of sodium + 4 Water	....	—10.6 "
1 Chloride of potassium + 4 Water	....	—11.8 "
5 Sal ammoniac + 5 Saltpetre + 16 Water	+10 deg.	—12 "
1 Nitrate of ammonia + 1 Water	+10 "	—15.5 "
8 Sulphate of sodium + 5 conc. Sulphuric acid	+10 "	—17 "
1 Sulphocyanate of Potass. + 1 Water	+18 "	—21 "
1 Chloride of sodium + 3 Snow	....	—21 "
1 Sal ammoniac + 1 Saltpetre + 1 Water	+ 8 deg.	—24 "
3 Crystal. chloride of calcium + 1 Snow	....	—36 "
1 Snow + 1 dilute Sulphuric acid	— 5 deg.	—41 "

AMERICAN PHOTOGRAPHIC SOCIETIES.

AKRON CAMERA CLUB.—Akron, Ohio. Established November, 1890. Headquarters, Hall Block, corner of Howard and Market Streets. Date of meetings, second and last Tuesday in each month. Membership 56. *President*, J. Dwight Palmer. *Vice-President*, Dr. J. L. Lee. *Treasurer*, E. J. Hoskins. *Secretary*, Chas. E. Smith. *Corresponding Secretary*, H. J. Truscott. Annual exhibition, January or February, of each year.

ALABAMA AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established December, 29, 1887. Headquarters, 916 Broad Street. Date of meetings, first Thursday in each month. Annual meeting, first Thursday in January. Membership, 25. *President*, Wm. S. Monk. *Secretary-Treasurer*, Orlando Tripp. *Librarian*, Miss Mary Morgan Keipp, Selma, Dallas County, Alabama.

ALBANY CAMERA CLUB.—Organized 1887; Incorporated 1891. Headquarters, 72 Chapel Street. Date of meetings, first Friday in each month, July, August and September omitted. Membership, 73. *President*, Col. Augustus Pruyn. *Vice-President*, Chas. W. Reynolds. *Secretary*, M. H. Rochester. *Treasurer*, T. L. Carroll. *Librarian*, Wm. C. Miller. Annual exhibition, usually in January.

ALTOONA CAMERA AND ART CLUB.—Altoona, Pa. Established October 1900. Headquarters, Mechanics' Library. Date of meetings, first and third Tuesday. Membership, 12. *President*, Horace R. Smith, M. D. *Secretary*, W. J. Hamer. Annual exhibition, November.

AMERICAN LANTERN SLIDE INTERCHANGE.—Principal office, 361 Broadway, New York. Organized, 1885. *General Manager*, F. C. Beach. To interchange twelve sets of slides every month (except July and August) among the Clubs comprising the Interchange.

ASACOG CAMERA CLUB.—Established September 18, 1901. Headquarters, 52 Sands Street, Brooklyn. Date of meetings Wednesday nights. Membership, 15. Minimum age, 14 years. Exhibitions annually.

ASSOCIATION CAMERA CLUB.—Marion, Ohio. Established April, 1900. Headquarters, Y. M. C. A. Building. Meetings, first and third Tuesday in each month. Membership, 19. *President*, O. E. Kennedy. *Secretary*, H. J. Mantz. Exhibitions at Y. M. C. A. January 1st.

ATHENS CAMERA CLUB.—Athens, Pa. Established May, 1901. Headquarters, 123 South Main Street. Date of meetings, every Wednesday evening. Membership, 20. *President*, Ansel W. Newman. *Vice-President*, H. D. Sevison. *Secretary*, Irving K. Park. *Treasurer*, F. E. Weller. Exhibitions annually. Annual meeting, first Wednesday in April.

BANGOR CAMERA CLUB.—Bangor, Me. Established April, 1901. Membership, 20. *President*, F. L. Sekenger. *Secretary*, A. S. Allen, 49 Hammond Street. (P. O. Box 815.)

BAY SHORE CAMERA CLUB.—Bay Shore, L. I. Established 1899. Headquarters, Robins Block. Date of meetings, second Monday in each month. Membership, 67. *President*, Howard M. Ross. *Secretary*, Howard R. Glutzbeck, Bay Shore, L. I. Exhibitions annually.

BOSTON CAMERA CLUB.—Established 1881. Headquarters, 50 Bromfield Street, Boston, Mass. Date of meetings first Monday, except July, August, September. Annual meeting, first Monday in January. Membership: 79 active, 6 associate, 10 honorary. *President*, William R. Richards. *Vice Presidents:* Chas. H. Currie, Wm. R. Cabot, Francis H. Manning. *Treasurer*, Chas. H. Chandler. *Librarian*, Mrs. R. R. French. *Secretary*, Chas. Hall Perry, 50 Bromfield Street. Annual exhibition, April.

BROCKTON CAMERA CLUB.—Established April 9, 1894. Headquarters. Arcade Building, Main Street, Brockton, Mass. Date of meetings, third Friday in each month. Members, 75. *President*, Geo. C. Bolling. *First Vice-President*, E. T. Wood. *Second Vice-President*, Dr. J. F. Allan. *Secretary*, David Tyndall. *Treasurer*, Fred. Kimball. *Librarian*, W. F. Allan. Exhibitions annually.

BROOKLYN ACADEMY OF PHOTOGRAPHY. — Organized and incorporated February 16, 1887. Headquarters, 177 Montague Street, Brooklyn, N. Y. Date of meetings, first Monday in each month. Membership, 60. *President*, Dr. John Merritt. *First Vice-President*, A. N. Coak. *Second Vice-President*, M. R. Jones. *Recording Secretary*, H. W. Hodges. *Corresponding Secretary*, G. A. Williams. *Treasurer*, Wm. I. Wintringham. *Librarian*, Russell E. Prentiss. Annual exhibition in May.

BROOKLYN CAMERA CLUB (INCORPORATED).—Organized 1898. Incorporated 1900. Headquarters, 776 Manhattan Avenue, Brooklyn, N. Y. Date of meetings, first Wednesday in each month. Membership, 85. *President*, E. O. Torbohm. *Secretary*, J. G. Dodson. Exhibitions in November.

BUFFALO CAMERA CLUB.—Buffalo, N. Y. Organized October, 1889. Headquarters, Central Y. M. C. A. Building. Date of meetings, second and fourth Thursday in each month. Membership, 38. *President*, H. Wilson Saunders. *Vice-President*, Edward B. Sides. *Treasurer*, Walter E. Bertling. *Secretary*, Fred. J. Debus, 263 Hickory Street, Buffalo, N. Y. *Lantern-Slide Director*, John P. Zenner. Annual exhibition in December.

CALIFORNIA CAMERA CLUB.—San Francisco, Cal. Organized March 18, 1890. Incorporated. April 5, 1890. Headquarters, Academy of Science Building, San Francisco, Cal. Date of meetings, second Tuesday in each month. Membership, 400. *President*, A. L. Coombs. *First Vice-President*, H. B. Hosmer. *Second Vice-President*, J. R. Gwynn. *Secretary*, W. E. Palmer. *Treasurer*, J. J. Lermen. *Librarian*, S. Purnell. *Corresponding Secretary*, Chas. A. Gal. Exhibitions, monthly illustrated lectures, monthly print exhibitions, and exhibitions of interchange slides.

"CAMERADS."—New Brunswick, N. J. Reorganized April 24, 1890. Headquarters, corner of Church and Neilson Streets. Date of meetings, fourth Thursday in each month. Membership, 20. *President*, Geo. K. Parsell. *Vice-President*, J. Arthur Blish. *Secretary-Treasurer*, Harvey Iredell.

CAMPTOWN CAMERA CLUB.—Irvington, N. J. Headquarters, 1027 Springfield Avenue. Date of meetings, every Thursday in each week. Membership, 14. *President*, Herman Fischer. *Vice-President*, Jos. H. Ducker. *Secretary-Treasurer*, Edward J. Webb, 38 Park Avenue, Irvington, N. J. Annual exhibition, no fixed date.

CAPE ANN CAMERA CLUB.—Cape Ann, Mass. Established 1900. Headquarters, Center's Block. Date of meetings, first and third Friday in each month. Membership, 28. *President*, Finley A. Docherty. *Treasurer*, Conrad R. Hanson. *Secretary*, Herman W. Spooner. Annual exhibition, second Tuesday in March.

CAPITAL CAMERA CLUB.—Established 1891. Headquarters, 1010 F Street, N. W., Walter Building. Date of meetings, regular business, first Saturday in each month. Membership, 90. *President*, Wm. P. Herbst. *Vice-President*, W. E. Diefenderfer. *Secretary*, Corry M. Stadden. *Corresponding Secretary*, Miss Kate S. Curry. *Treasurer*, Wallace G. Babcock. *Librarian*, Francis C. Crow. Annual exhibition is held usually in last week in April or first week in May.

CENTRAL CAMERA CLUB.—Established 1889. Headquarters, 502 Fulton Street, Brooklyn, N. Y. Date of meetings, first and third Monday. Membership, 42. *President*, Geo. H. Kutz. *Vice-Presdent*, F. W. Surbeck. *Secretary*, Wm. S. Cole. *Treasurer*, John L. Freedlund. Exhibition, last week in October.

CENTURY CAMERA CLUB.—Established 1900. Headquarters, 2207 Poplar Street, Erie, Pa. Date of meetings, second and Fourth Tuesday. *President*, Bert Gerred. *Secretary*, Gust. Holmquist, 2207 Poplar Street, Erie, Pa. Exhibitions, every quarter.

CHELTON HILLS PHOTOGRAPHIC CLUB.—Established February 25, 1901. Headquarters, members' residences. Date of meetings last Tuesday in each month. Membership, 26 *President*, J. W. Ridpath. *Secretary*, Jos. F. Gross, 448 Leedow Street, Jenkintown, Pa. Exhibitions, public exhibitions annually; members exhibit, monthly.

CHICAGO SOCIETY OF AMATEUR PHOTOGRAPHERS (THE ART INSTITUTE).—Established December, 1886. Incorporated July 21, 1894. Headquarters, The Art Institute, Chicago, Ill. Date of meetings: ordinary meetings, Wednesday or Friday each week. Membership, 242. *President*, Wm. P. Gunthorp. *Secretary*, E. W. Thomas. Annual Salon, in December and January.

CLEVELAND CAMERA CLUB.—Established May 22, 1902. Incorporated June 9, 1902. Headquarters, 625 Caxton Building, Cleveland, Ohio. Date of meetings, second and fourth Wednesday in each month, except July and August. Membership, 55. *President*, C. F. Dixon. *Secretary*, Alexander C. Bates, 121 Euclid Avenue, Cleveland, Ohio. Annual public exhibition in March. Members print exhibit monthly.

COLORADO CAMERA CLUB.—Established October 26, 1891. Headquarters, Appel Building, 1230 Sixteenth Street, Denver, Colo. Date of meetings, general, first Friday in each month; Board of Directors, last Friday in each month. Membership, 91. *President*, Thos. A. Morgan. *Vice-President*. Capt. H. D. Smith. *Secretary*, Geo. L. Beam. *Treasurer*, Chas. S. Price. Annual Exhibition, date set each year.

COLUMBIA PHOTOGRAPHIC SOCIETY.—Established 1889. Incorporated 1894. Headquarters, 1811 N. Broad Street, Philadelphia, Pa. Date of meetings, first Monday, and second and fourth Thursday in each month. Membership, 150. *President*, Dr. G. J. R. Miller. *Secretary*, Harry A. Vossen, 1024 N. Lawrence Street, Philadelphia, Pa. Annual exhibition, first month in each year.

COLUMBIAN PHOTO-AMATEUR EXCHANGE.—Established 1893. Limited membership of fifteen. *President*, A. H. Waite, Seattle, Wash. *Secretary*, W. E. Dickinson, Osage, Iowa. Exchange prints quarterly.

COLUMBUS CAMERA CLUB,—Columbus, Ohio. Date of meetings, every Tuesday evening. Membership, 25. *President*, J. E. Stearns. *Secretary*, W. W. Thune, 1258 Oak Street, Columbus, Ohio.

CROSS COUNTRY CAMERA CLUB.—Hyde Park, Mass. Organized 1898. Headquarters, Unity Building. Date of meetings, second Tuesday in each month. *President*, Geo. H. Rausch. *Secretary*, Frank R. Heustis. Talks and demonstrations are given from time to time. Meetings every Saturday night for informal discussion. Annual exhibit in May.

DAGUERRE CAMERA CLUB.—Established 1892. Date of meetings, first Monday in each month. Membership, 24. *President*, F. T. Blish. *Secretary*, W. B. Sizer, Harbert, Mich. Exhibitions in July yearly.

DENVER (COLORADO) Y. M. C. A. CAMERA CLUB.—Established November 10, 1899. Headquarters, Y. M. C. A. Building, 1731 Arapahoe Street, Denver, Colo. Date of meetings, Club annually, Third Tuesday in September; Board of Directors, monthly, fourth Friday in each month. Membership, 22. *President*, I. W. Larrimore. *Secretary*, Irving Royston Larrimore, Y. M. C. A. Central. Annual exhibition in January.

EAST END CAMERA CLUB.—Established April, 1900. Headquarters, Institute Rooms, Cedar Avenue, opposite Bertram Street. Date of meetings, first Tuesday in each month. Membership about 30. *President*, E. Sanderson. *Secretary*, A. S. Smith, 37 Kenwood Street.

EASTERN CAMERA CLUB.—Headquarters, 241 East 104th Street, New York City. *President*, Frederick Wirth, Jr. *Vice-President*, Lester Nussbaum. *Secretary*, Henry Smolensky. *Treasurer*, Frank Zimmerman. *Librarian*, Lester R. Light. *Financial Secretary*, Henry Herzman.

ESSEX CAMERA CLUB.—Established July 7, 1899. Headquarters, 883 Broad Street, Newark, N. J. Date of meetings, second Tuesday of each month. Membership 61. *President*, W. W. Lakin. *Secretary*, Frank L. Ferguson, 28 Baldwin Street. Exhibitions or Social, fourth Tuesday of each month.

GREENVILLE CAMERA CLUB (Jersey City).—Established January, 1899. Headquarters, Club House at Greenville Schuetzen Park. Date of meetings, first Sunday in each month. Membership 17 (limited to 20). *President*, William Rabidoux. *Secretary*, A. A. Langer, 116 Danforth Avenue, Jersey City. Semi-annual lantern-slide exhibitions, spring and fall.

HAMILTON SCIENTIFIC ASSOCIATION (Photographic Section).—Hamilton, Ont., Can. Established 1891. Headquarters, Public Library Building. Date of meetings, second and fourth Mondays in each month. Membership 80. *President*, Jas. B. Bertram. *Secretary*, Walter E. Hill. Annual exhibition, about fourth week in March, 1904.

HARTFORD SCIENTIFIC SOCIETY (Photographic Section).—Established February 18, 1885. Headquarters, 803 Main Street, Hartford, Conn. Date of meetings, first and third Tuesdays in each month. *Chairman*, E. Y. Judd. *Secretary*, E. W. Bush, Aetna Life Insurance Company's Building. Membership, 125. Annual exhibition, in April.

HAVERHILL CAMERA CLUB.—Haverhill, Mass. Established February, 1888. Headquarters, Rooms 44 and 45 Daggett Building. Date of meetings, regular meeting, second Tuesday of each month. Membership, active, 40; honorary, 1. *President*, William H. Burke. *Secretary-Treasurer*, George J. Kaula. Exhibitions, no fixed date.

HOLYOKE CAMERA CLUB.—Headquarters, 412 High Street, Holyoke, Mass. Date of meetings, second Tuesday in each month. Membership, 30. *Secretary*, Ralph W. E. Swain, 38 Taylor Street.

INTERNATIONAL PHOTO. PRINT EXCHANGE.—Organized May, 1893. A photographic print exchange limited to 20 members, who reside in different countries. *Secretary-Treasurer*, Walter Sprange, Beach Bluff Hall, Swampscot, Mass.

KENSINGTON CAMERA CLUB.—Established April, 1900. Reorganized April, 1903. Headquarters, 2832 Kensington Avenue, Philadelphia, Pa. Date of meetings, second Tuesday in each month. Membership, limited to 25. *President*, Alfred Clegg. *Secretary*, Henry Elcock, 2422 N. Reese Street. Demonstrations and exhibitions, first, third and fourth Tuesday of each month, except June, July and August.

LANCASTER CAMERA CLUB.—Established May 15, 1895. Headquarters, Rooms of Walter Meiser, W. King Street. Date of meetings, first Thursday of each month. Membership, 13. *President*, William S. Gleim. *Secretary*, F. A. Demuth, 114 E. King Street, Lancaster, Pa.

LAWRENCE CAMERA CLUB.—Lawrence, Mass. Established February 28, 1890. Headquarters (for correspondence), 29 Valley Street. Date of meetings, second Monday of every month; annual meeting, second Monday in March. Membership, 7. *President*, Robert D. Stevens. *Secretary*, William J. Prince, 29 Valley Street.

LOS ANGELES CAMERA CLUB.—Los Angeles, Cal. Established December, 1899. Incorporated May 1, 1900. Date of meetings, second and fourth Friday in each month; social meetings, third Fridays. Membership, 100. *President*, F. Hammer Maude. *Corresponding Secretary*, Helen L. Davie. Headquarters, 321 South Hill Street, Los Angeles, Cal.

MANCHESTER (N. H.) CAMERA CLUB.—Established 1898. Headquarters, 64 Hanover Street. Date of meetings, first and third Wednesday evenings of each month; annual meeting, first Wednesday evening in May. Membership, 25. *President*, James E. Currier. *Secretary*, Charles L. Harmon, 64 Hanover Street.

MANUAL TRAINING HIGH SCHOOL CAMERA CLUB.—Established 1895. Headquarters, 76 Court Street, Brooklyn, N. Y., room 18 in School building. Date of meetings, first and third Thursdays in each month. Membership, 65; alumni membership, 55. *President*, Richard Claggell. *Secretary*, Robert Redlefson, Manual Training High School, Brooklyn, N. Y. Exhibitions, Christmas vacations.

MEADVILLE CAMERA CLUB.—Established June, 1889. Meet at residence of members. Date of meetings, last Friday of each month Membership, 24. *President*, P. B. Graham. *Secretary*, Miss Mary Brunett, Meadville, Pa.

MINNEAPOLIS CAMERA CLUB.—Established 1892. Headquarters, Public Library. Date of meetings, every other Wednesday from September to May inclusive. *President*, H. E. Murdock. *Secretary*, C. J. Hibbard, 323 Hennepin Avenue. Annual exhibit, April.

MONTCLAIR CAMERA CLUB.—Established 1898. Headquarters, Club Rooms, Crane building, Montclair, N. J. Date of meetings, 10th of each month. *President*, Dr. Morgan W. Ayers. *Secretary*, William B. Smith. Membership, 70. Annual Exhibition of prints in May; annual exhibition of lantern-slides in October.

MONTREAL CAMERA CLUB.—Headquarters, 44 Victoria Street, Montreal, Can. Date of meetings, every Tuesday, October 1 to May 1. Membership, 138. *President*, A. W. Cole. *Secretary*, Albert Holden, 30 St. John Street. Exhibitions, annually.

NEWARK CAMERA CLUB.—Established April 18, 1888. Headquarters, 222 Market Street, Newark, N. J. Date of meetings, every second and fourth Monday. Membership, 50. *President*, W. S. Norris. *Secretary*, William Hoesly, 53 Columbia Avenue, Vailsburg, N. J.

NEW YORK CAMERA CLUB.—Established 1884. Headquarters, 3 W. 29th Street, New York City. Date of meetings, second Tuesday of each month, September to July. Membership, 340. *President*, C. H. Crosby. *Secretary*, H. B. Hart, 3 West 29th Street, New York City. Exhibitions, annually for members, monthly for individuals.

ORANGE CAMERA CLUB.—Established March, 1892. Headquarters, Orange, N. J. Date of meetings, 5th and 20th of each month. Membership, 93. *President*, E. S. Butterfield. *Secretary*, E. L. Gould, 75 South 11th Street, Newark, N. J.

OREGON CAMERA CLUB.—Portland, Ore. Established January, 1895; Incorporated June 14, 1902. Headquarters, Macleary Building. Date of meetings, second Tuesday of each month. Membership, 204. *President*, S. A. Thrall. *Secretary*, B. E. Fiske. Annual print exhibition in December.

PENDLETON CAMERA CLUB.—Pendleton, Ore. Established June 18, 1899; Incorporated. Headquarters, Association Block. Date of meetings, Tuesday of each week. Membership, 20. *President*, Lee Morehouse. *Secretary*, H. L. Hasbrouck, Pendleton, Ore.

PHILADELPHIA CAMERA CLUB (Incorporated).—Established May 27, 1902. Headquarters, Studio and Club rooms, 3818, Lancaster Avenue, Philadelphia. Date of meetings, fourth Tuesday of each month. Membership, 63. *President*, A. P. Fleming. *General Secretary*, E. M. Shannon, 3853 Lancaster Avenue. Annual exhibition, no set date.

PHOTO-FELLOWS OF THE WATERBURY SCIENTIFIC SOCIETY.—Established March 20, 1902. Headquarters, 27 East Main Street. Room 9. Waterbury, Conn. Date of meetings, first Monday of each month. Membership, 25. *President*, Walter W. Peircey. *Secretary*, Thomas Greenwood, 412 N. Main Street. Exhibitions, third Monday in June and October of each year.

PHOTOGRAPHIC CLUB OF BALTIMORE CITY.—Established 1885. Headquarters, 870 Linden Avenue, Baltimore, Md. Date of meetings, business meeting on first Tuesday every month; meetings are held every Tuesday night for lectures, exhibitions of apparatus and slides demonstrations, etc. Membership, active, 42; associate, 15; honorary, 7; non-resident, 4; total, 68. *President*, Percy M. Reese, *Secretary*, James W. Bowers, Jr., 870 Linden Avenue.

PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.—Established 1862; Incorporated 1885. Headquarters, 1722 Arch Street, Philadelphia, Pa. Date of meetings, second, third and fourth Wednesdays, at 8 P. M. Membership, 210. *President*, Walter P. Stokes. *Secretary*, George Donehower, 905 Commonwealth Trust Building. Exhibitions, The Philadelphia Photographic Salon in connection with the Pennsylvania Academy of Fine Arts. Members' annual exhibition in January.

PITTSBURG ACADEMY OF SCIENCE AND ART.—Organized January 23d, 1900. Headquarters, Carnegie Institute, Shenley Park. Date of meetings, second and fourth Tuesday of each month. Membership September 1st, 1903, 82. *President*, Frank A. Hastings. *Vice-President*, Norman McClintock. *Secretary*, J. M. Conner, Shetland and Finley Aves., Pittsburgh, Pa. *Director-Treasurer*, O. C. Reiter.

PORTLAND CAMERA CLUB.—Portland, Me. Established May 24, 1899. Headquarters, 571½ Congress Street. Membership, 56. *President*, N. W. Edson. *Secretary*, O. P. T. Wish. *Corresponding Secretary*, N. D. Gould.

PORTSMOUTH CAMERA CLUB.—Established 1897. Headquarters, 614 Crawford Street, Portsmouth, N. H. Date of meetings, 10th of each month. Membership, 27. *President*, J. N. Dews. *Secretary*, H. T. Richardson, P. O. Box 124.

POSTAL PHOTOGRAPHIC CLUB.—Established December, 1888. Headquarters, 613 Maryland Avenue, S. W. Washington, D C. Membership, 40. *President*, Charles E. Fairman. *Secretary*, G. A. Brandt, 631 Maryland Avenue, S. W. Washington, D. C. Albums and note-books are circulated among the members for mutual instruction.

PROVIDENCE CAMERA CLUB.—Established 1883; Incorporated 1889. Headquarters, 152 Weybosset Street, Providence, R. I. Date of meetings, annual, second Wednesday in June; Club nights, second Wednesday. Membership, active, 122; associate, 23; honorary, 1. *President*, C. M. Lee. *Secretary*, Harry S. Wolfe. Annual exhibition, March 16 and 22.

QUEENS COUNTY CAMERA CLUB.—Established July 1, 1901. Headquarters, Bernhard Court, Fulton Street, Jamaica, L. I. Date of meetings, last Saturday of each month. Membership, 49. *President*, Dr. H. Noble. *Secretary*, Henry D. Johnson, Jamaica, L. I. Annual exhibition in June.

ROSE TECH. CAMERA CLUB.—Terre Haute, Ind. Established 1897. Headquarters, Rose Polytechnical Institute. Date of meetings, date arranged about two weeks previous to meetings. Membership, 30. *President*, Roy W. Hill. *Secretary*, Leo F. Dorn. Annual exhibition in June.

RUTLAND CAMERA CLUB.—Established October 20, 1888. Headquarters, 149 S. Main Street, Rutland, Vt. Date of meetings, second and fourth Tuesday in each month. Membership, 13. *President*, Cornele G. Ross. *Secretary*, V. F. Worcester, 149 South Main Street, Rutland, Vt.

RUTLEDGE CAMERA CLUB.—Established June, 1900. Headquarters, room in Rutledge Institute. Date of meetings, second Friday in each month. *President*, J. H. Weeks. *Secretary*, M. B. Wicks, Rutledge, Pa.

SAN DIEGO CAMERA CLUB.—San Diego, Cal. Established May 12, 1900. Headquarters, San Diego Commercial College rooms, 4th and C Streets. Date of meetings, first and third Wednesday evenings Membership, 25. *President*, F. W. Kelsey. *Secretary*, Samuel Schiller, 1033 F Street.

SAVANNAH CAMERA CLUB.—Savannah, Ga. Established June 10, 1897. Headquarters, Bull Street and Park Avenue. Date of meeting, every Wednesday evening. Membership, 44 *President*, H. C. Shurptrine. *Secretary*, J. M. Rich. Annual exhibition, usually in November.

SUNNY SIDE CAMERA CLUB.—St. Louis, Mo. Established October 10, 1891. Headquarters, 5902 S. Broadway (third floor) Date of meetings, first and third Thursdays in every month. Membership, 21. *President*, Barthuld W. Blumenthal. *Secretary*, William A. Brichner, 4702 S. Compton Avenue. Exhibitions, annually.

SYRACUSE CAMERA CLUB.—Organized 1886; incorporated January 19, 1892. Headquarters, 302 to 312 University Building, Syracuse, N. Y. Date of meetings, regular meetings every Friday. Membershp, 117; limit 125. *President*, Dan. H. Sweet. *Secretary*, L. D. Holmes. Annual exhibition, date movable, in March or April.

TAUNTON CAMERA CLUB.—Established July 11, 1900. Headquarters, 2½ East Brittania Street, Taunton, Mass. Date of meetings, first Thursday evening each month. Membership, 25 active, 30 associate. *President*, Fred. C. Whitehead. *Secretary*, William A. Bellamy, 34 Winter Street. The Club is a member of the New England Photographic Exchange.

TORONTO CAMERA CLUB.—Toronto, Can. Date of meetings, every Monday evening. *President*, H. B. Lefroy. *Secretary*, W. A. Smith, 50 Esplanade Street West Toronto, Can.

TOWN AND COUNTRY CLUB.—Minneapolis, Minn. Established 1901. Date of meetings, every week, at which lectures are given pertaining to camera work. *President*, George L. Nevins. *Secretary*, Melvin W. Wright. Exhibition, annually.

TRENTON PHOTOGRAPHIC SOCIETY.—Established January, 1898. Headquarters, 132 E. State Street, Trenton, N. J. Date of meetings, second Monday in every month. Membership, 32. *President*, James I. Woolverton. *Secretary*, Grant Castner, 329 Tyler Street, Trenton, N. J. Annual exhibitions.

VALLEY CAMERA CLUB.—Phœnix, R. I. Established November 18, 1896. Membership, 60. *President*, Ward E. Smith. *Secretary*, J. Bancroft, Lawton, Phœnix, R. I. Box 43.

WALLINGFORD CAMERA CLUB.—Established 1897. Headquarters, Academy Street, Wallingford, Conn. Date of meetings, third Monday every month. Membership, 27. *President*, Lothar Baron von Grave. *Secretary*, F. L. Lathrop, 490 North Main Street, Wallingford, Conn. Exhibition, December.

WASHINGTON CAMERA CLUB.—Established and incorporated May, 1900. Headquarters, Ferry Museum, Tacoma, Wash. Date of meetings, regular monthly, first Wednesday each month. Membership, 40. *President*, Charles Bedford *Secretary*, W. H. Orilstrap, Ferry Museum, Tacoma, Wash.

Y.M.C.A. CAMERA CLUB.—Los Angeles, Cal. Established June 5, 1901. Headquarters, Y.M.C.A., Los Angeles, Cal. Date of meetings, first Wednesday every month. Membership, 20. *President*, Edward G. Witt. *Secretary*, Charles E. Stanton, 439-41 S. Main Street, Los Angeles, Cal.

FOREIGN PHOTOGRAPHIC SOCIETIES.

GERMAN.

DEUTSCHER PHOTOGRAPHEN-VEREIN, Weimar. Address: K. Schwier, Weimar. Organ: Deutsche Photographen-Zeitung.

PHOTOGRAPHISCHER VEREIN ZU BERLIN, Berlin. Address: Paul Grundner, Berlin W. 35, Potsdamerstr. 111. Organ: Das Atelier des Photographen, mit Photographischer Chronik.

VEREIN BREMER FACHPHOTOGRAPHEN, Bremen. Address: Georg Koch, Phot., Bremen, auf der Brake 20. Organ: Allgemeine Photographen-Zeitung.

VEREIN SCHLESISCHER FACHPHOTOGRAPHEN, Breslau. Address: Paul Uhr, Breslau, Gneisenaustr. 12. Organ: Das Atelier des Photographen.

CASSELER PHOTOGRAPHEN-VEREIN, Cassel. Address: Gust. Ewald, Cassel, Giessbergstr. 9.

RHEINISCH-WESTFÆLISCHER VEREIN ZUR PFLEGE DER PHOTOGRAPHIE UND VERWANDTEN KÜNSTE IN CÖLN A. RH., Cöln a. Rh. Address: Carl Ibscher, Cöln a. Rh., Hohe Pforte 10; or, Jul. Axmacher, Cöln a. Rh., Kyffhäuserstr. 30. Organ: Das Atelier des Photographen.

DORTMUNDER PHOTOGRAPHEN-VEREIN, Dortmund. Address: Emil Groote, Phot., Dortmund.

SÆCHSISCHER PHOTOGRAPHEN-BUND, Dresden. Address: James Aurig, Dresden-Blasewitz, Hainstr. 14. Organ: Allgemeine Photographen-Zeitung.

DÜSSELDORFER PHOTOGRAPHEN-VEREIN, Düsseldorf. Address: H. Luck, Düsseldorf, Bismarckstr. 65. Organ: Atelier des Photographen.

BERGISCH-MARKISCHER PHOTOGRAPHEN-VEREIN, Elberfeld-Barmen. Address: R. Schlegel, Elberfeld, Casinostr. 7; Walther Richter, Elberfeld, Herzogstr. 20. Organ: Das Atelier des Photographen.

THÜRINGER PHOTOGRAPHEN BUND, Erfurt. Address: Paul Strnad, Hofphot., Erfurt. Organ: Allgemeine Photographen-Zeitung.

PHOTOGRAPHISCHE GENOSSENSCHAFT VON ESSEN UND BENACHBARTEN STÆDTEN, Essen a. d. Ruhr. Address: Photographische Genossenschaft, Essen a. d. Ruhr, z. H. des Herrn Roland Risse, Phot., Bochum. Organ: Das Atelier des Photographen.

VEREIN ZUR PFLEGE DER PHOTOGRAPHIE UND VERWANDTER KÜNSTE IN FRANKFURT A. M., Frankfurt a. M. Address: Th. Haake, Frankfurt a. M. Organ: Photographische Correspondenz.

VEREIN HALLESCHER FACHPHOTOGRAPHEN, Halle a. d. Saale. Address: Th. Molsberger, Phot., Halle a. d. Saale, Breitestr. 31. Organ: Das Atelier des Photographen.

PHOTOGRAPHISCHE GESELLSCHAFT ZU HAMBURG-ALTONA, Hamburg. Address: F. A. Dahlström, Hofphot., Altona, Reichenstr. 2. Organ: Photographische Chronik.

PHOTOGRAPHISCHER VEREIN HANNOVER, Hannover. Address: F. Heiler, Photograph, Hannover, Hildesheimer Strasse 226 B. I. Organ: Atelier des Photographen.

Vereinigung Karlsruher Fachphotographen E. V., Karlsruhe (Baden). Address: Th. Schuhmann, Jr., Karlsruhe (B.), Amalienstr. 57. Organ: Das Atelier des Photographen.

Kieler Photographen-Verein, Kiel.

Schleswig-Holsteinischer Photographen-Verein, Kiel. Address: Otto Koch, Elmshorn. Organ: Atelier des Photographen.

Freie Innung für die photographischen Gewerbe für Leipzig und Umgegend, Leipzig. Address: Emil Hoffmann, i. Fa. M. Taggesell, Leipzig, Zeitzerstr. 23.

Münchener Photographische Gesellschaft, München. Address: Lud. Kieser, Marienplatz 22 I. Organ: Atelier des Photographen.

Süddeutscher Photographen-Verein, München. Address: Secretariat des Süddeutschen Photographen-Vereins, München, Herrenstr. 20. Organ: Photographische Kunst.

Photographische Gesellschaft Nürnberg und Umgegend, Nürnberg. Address: Oscar Kaupert, Nürnberg, am Plärrer 4a. Organ: Atelier des Photographen.

Mærkisch-Pommerscher Photographen-Verein, Prenzlau. Address: Albert Klatt, Eberswalde, or Schriftführer Leuchert, Phot., Prenzlau. Organ: Atelier des Photographen.

Verband Mecklenburg-Pommerscher Photographen, Rostock (Meckl.). Address, F. Doose, Phot., Rostock (Meckl.), Augustenstr.

Elsass-Lothringisher Photographen-Verein. Address: Johann Mehlbreuer, Strassburg (E.), Steinwaldstr. Organ: Atelier des Photographen.

AUSTRIAN.

Photographische Gesellshaft in Wien, Wien. Address: Bureau der Photograph. Gesellschaft, Wien II, Karmelitergasse 7. Organ: Photographische Correspondenz.

FOREIGN CAMERA CLUBS.

GERMAN.

Aachener Amateur-Photographen-Club, Aachen. Address: Fr. Klaff, Chemiker, Aachen, Lousbergstr. 2. Organ: Photographische Mittheilungen.

Vereinigung von Amateur-Photographen zu Altona, Altona a. d. Elbe. Address: Ed. Renner, Rechtconsulent, Altona, Neueburg 3. Organ: Photographische Mittheilungen.

Amateur-Photographen-Verein Augsburg, Augsburg. Address: Jacob Eberlen, Fabrikant, Augsburg, Ludwigsplatz C. 17 II. Organ: Photographisches Centralblatt, Photographische Mittheilungen. Photographische Rundschau, Apollo.

Verein für Liebhaber-Photographie, Barmen. Address: Adolf Kapp, Barmen, Wuppermannstrasse 16. Organ: Photographische Mittheilungen.

Amateur-Photographen-Verein Berlin, Berlin. Address: Herm. Negendank, Berlin NO 18, Langenbeckstrasse 4. Organ: Apollo.

Amateur-Photographen-Vereinigung "Eos," Berlin. Address: Hermann Kloy, Postbeamter, Berlin C 25, Bartelstrasse 8a. Organ: Photographische Mittheilungen.

Deutsche Gesellschaft von Freunden der Photographie, Berlin. Address: Franz Goemann, Berlin W 56, Werderscher Markt 4a. Organ: Photographische Rundschau.

Freie Photographische Vereinigung, Berlin. Address: W 64, Unter den Linden 11, Berlin. Organ: Photographische Rundschau.

Lichtbild-Verein Berlin, Berlin. Address: Hugo Schultz. Drogist, Berlin N 39, Müllerstrasse 166a. Organ: Photographische Mittheilungen, Apollo.

Verein zur Förderung der Photographie in Berlin, Berlin. Address: P. Hanneke, Berlin W 30, Winterfeldstr. 35. Organ: Photographische Mittheilungen

Verein "Freunde der Photographie," Beuthen (Ob. Schles.) Address: J. Waida, Buchhalter, Beuthen (Ober-Schlesien), Pickarnstr. 38. Organ: Apollo, Lechners Mittheilungen.

Amateur-Photographen-Vereinigung, Bingen a. Rh. Address: Dr. med. A. Linden, Bingen a. Rh. Organ: Photographische Mittheilungen.

Photographische Gruppe der "Litteraria," Blankenburg (Harz). Address: Fritz Hoefer, Buchhandlung, Specialgeschätt für Photographie, Blankenburg (Harz).

Amateur-Photographen-Club Bonn, Bonn, Hotel Rheingold, am Markt. Address: H. Fischer, Bildhauer, Bonn, Adolfstr. 42. Organ: Rundschau, Atelier des Photographen.

Photographische Vereinigung Bonn. Address: Dr. E. Herfeldt, Bonn, Weberstr. 61.

Verein von Freunden der Photographie, Braunschweig. Address: Adolf Steinhausen, Braunschweig, Steinweg 26. Organ: Photographische Rundschau.

Photographische Gesellschaft zu Bremen (E. V.), Bremen. Address: Vorstand der Photographischen Gesellschaft zu Bremen, Bremen, Ausser der Schleifmühle 31. Organ: Photographische Rundschau.

Amateur-Photographen-Verein Breslau, Breslau.

Schlesische Gesellschaft von Freunden der Photographie, Breslau. Address: Dr. B. Reisenfeld, Ohlauer Stadtgraben 28. Organ: Photographische Mittheilungen.

Photographischer Club in Cassel, Cassel. Address: Wilhelm Hess, Optiker, Cassel, Schlossplatz. Organ: Photographische Rundschau.

Charlottenburger Camera-Club, Charlottenburg. Address: Volkmar Wimmer, Ingenieur, Charlottenburg, Herderstr. 9. Organ: Photographische Mittheilungen.

Photographische Gesellschaft Charlottenburg, Charlottenburg. Address: Verlagsbuchhändler Oscar Bolle, Wilmersdorf Berlin, Günzelstr. 43. Organ: Apollo, Photographisches Centralblatt, Photographische Mittheilungen.

Amateur-Photographen Verein Chemnitz, Chemnitz. Address: Ernst Emmrich, Lehrer, Chemnitz, Reichstr. 40.

Verein von Freunden der Photographie in Chemnitz, Chemnitz. Address: Paul Reinecker, Chemnitz, Weststr. 6.

Mittelrheinischer Liebhaber-Photographen-Verein, Coblenz (Hôtel zur Traube). Address: Dr. Julius Wegeler, Coblenz. Organ: Photographische Rundschau, Atelier des Photographen.

Freie Photographische Vereinigung in Crefeld, Crefeld. Address: Otto Scharf, Crefeld, Victoriastr. 139.

Westpreussische Gesellschaft von Freunden der Photographie in Danzig, Danzig. Address: Archidiaconus Blech, Danzig, St. Katharinen-Kirchplatz 2. Organ: Photographische Mittheilungen.

Verein von Freunden der Photographie zu Darmstadt, Darmstadt. Address: Dr. E. W. Büchner, Darmstadt, Alicestr. 18 II. Organ: Photographische Rundschau.

Amateur-Photographen-Verein Dessau, Dessau. Address: Vorsitzender Dr. med. S. Krüger, Dessau. Organ: Photographische Rundschau.

Dresdener Gesellschaft zur Förderung der Amateur-Photographie, Dresden. Address: E. Frohne, Dresden, Schumannstr. 24.

Gesellschaft für wissenschaftliche Photographie zu Dresden, Dresden. Address: An den 1. Vorsitzenden Herrn Adolph Herzka, Dresden, Gabelsbergstr. 15.

Amateur-Photographen-Verein Duisberg, Duisberg. Address: Carl Rojahn, Duisberg, Friedrich-Wilhelmstr. 7. Organ: Photographische Mittheilungen, Photographische Rundschau.

Bergischer Lichtbild-Verein, Eberfeld. Address: Dr. Levi, Eberfeld, Neustr. 4. Organ: Photographische Rundschau.

Verein für Amateur-Photographie, Eberfeld. Address: Rud. Gesser, Eberfeld, Strassburgerstr. 27 I. Organ: Apollo.

Photographischer Club zu Erfurt, Erfurt. Address: Hugo Büchner, Rentier, Erfurt, Villa Cyriaxstr.

Verein Freunde der Lichtbildkunst, Erfurt. Address: Rob. Müller, Erfurt, Gartenstr. 70 I.

Photographische Gesellschaft zu Eschweiler, Eschweiler. Address: W. Wirtz, Eschweiler, Dürenerstr. 34.

Freunde der Photographie Gera, Gera (R. j. L.). Address: Willy Dietzel, Gera (R. j. L.), Schuhgasse. Organ: Photographische Mittheilungen.

Amateur-Photographen-Vereinigung in Giessen, Giessen. Address: Stahl, grossh. Baurath, Giessen, Alicestr. 17.

Photographische Gesellschaft, Gleiwitz. Address: Herr Redacteur Albert Herling, Gleiwitz, Keithstrasse 18. Organ: Photographische Rundschau.

Photographische Gesellschaft zu Görlitz, Görlitz. Address: Renner, Apotheker, Görlitz, Consulstr. 21.

Vereinigung Gothaer Amateur-Photographen, Gotha. Address: Ingenieur Wedekind, Gotha, Ohrdruffer Strasse. Organ: Photographische Rundschau, Photographische Mittheilungen.

Photographischer Verein in Göttingen, Göttingen. Address: Dr. Ad. Wrede, Göttingen, Geismar-Chaussee 13. Organ: Photographische Rundschau.

Freunde der Photographie in Greiz, Greiz. Address: C Prüfes, Greiz (Vogtl.), Papiermühlenweg 14. Organ: Photographische Mittheilungen, Apollo.

Amateur-Photographen-Club, Guben. Address: Amateur-Photographen-Club, z. H. des Herrn Güterexpedient Vilten, Guben. Organ: Photographische Rundschau.

Amateur-Photographen-Verein Hagen (W.), Hagen (W.). Address: C. Wels, Architekt, Hagen (W.), Bergstr. 72 II. Organ: Photographische Rundschau.

Verein von Freunden der Photographie in Halberstadt, Halberstadt. Address: Oberlehrer Dr. Fass, Halberstadt, Westerhäuser Strasse 6.

Amateur-Photographen-Verein Halle a. d. S., Halle a. d. S. Address: C. E. Haase, Halle a. d. S., Dryanderstr. 33. Organ: Rathgeber f. Amateur-Photographen.

Photographische Gesellschaft in Halle a. d. S., Halle a. d. S. Address: Schriftführer Karl Knapp, Verlagsbuchhändler, Halle a. d. S., Mühlweg 19. Organ: Photographische Rundschau.

Freie Vereinigung von Amateur-Photographen zu Hamburg, Hamburg. Address: Freie Vereinigung von Amateur-Photographen, Hamburg, Dornbusch 2-4 part Organ: Photographisches Centralblatt, Photographische Mittheilungen.

Gesellschaft zur Förderung der Amateur-Photographie Hamburg, Hamburg. Address: Ernst Juhl, Hamburg, Schwanenwik 33. Organ: Photographische Mittheilungen.

Norddeutscher Amateur-Photographen-Verein, Hamburg. Address: Architekt Hindberg, Hamburg, Gellerstr. 3. Organ: Photographische Mittheilungen.

Photographische Gesellschaft zu Hamburg E. V., Hamburg. Address: Ad. Schmidt, Hamburg, Schenkendorfstr. 21 II. Organ: Photographische Rundschau, Photographische Mittheilungen, Lichtbildkünstler, Apollo.

Gesellschaft zur Förderung der Amateur-Photographie, Hamm (Westfalen). Address: C. Brinkmann, Hamm (Westfalen), Werlerstr. 39.

Verein von Freunden der Photographie, Heilbronn a. N. Address: Oskar Schmidt, Heilbronn a. N., Cäcilienstr. 62. Organ: Photographische Mittheilungen.

Gesellschaft von Freunden der Photographie in Jena, Jena. Address: Oskar Trinkler, Jena, Lutherstr. 87 I. Organ: Photographische Mittheilungen.

Photographische Gesellschaft in Karlsruhe, Karlsruhe (Baden). Address: Prof. F. Schmidt, Karlsruhe (Baden), technische Hochschule.

Photographische Gesellschaft. Kattowitz (Ob.-Schles.). Address: Eisenbahnbetriebs-Secretär Müller, Kattowitz (Ober-Schlesien), Roonstr. 24. Organ: Photographische Rundschau.

Photographische Gesellschaft in Kiel, Kiel. Address: Photographische Gesellschaft, Kiel. Organ: Photographische Mittheilungen.

Photographische Gesellschaft Königsberg (Pr.), Königsberg (Pr.). Address: F. Gscheidel, Cassenwart, Königsberg (Pr.), Junkerstr. 1.

Amateur-Photographen Leipzig, Leipzig. Address: Osw. Bemmann, Lehrer, Leipzig, Könneritz Strasse 29 I. Organ: Photographische Rundschau.

Gesellschaft zur Pflege der Photographie in Leipzig, Leipzig. Address: Gesellschaft zur Pflege der Photographie in Leipzig, Thomasgasse 4. Organ: Photographisches Centralblatt.

Photographische Gesellschaft zu Liegnitz, Liegnitz. Address: Max Engler, Ober-Postassistent, Liegnitz. Organ: Rathgeber für Amateur-Photographen.

Gesellschaft für freie Photographie, Lörrach (B.). Address: Gesellschaft für freie Photographie. Lörrach (B.). Organ: Photographisches Centralblatt, Photographische Mittheilungen.

Photographischer Club in Ludwigshafen, Ludwigshafen. Address: Photographischer Club in Ludwigshafen. Organ: Photographische Rundschau.

Photographischer Club zu Magdeburg, Magdeburg. Address: Hermann Held, Kaufmann, Magdeburg, Kaiserstrasse 54. Organ: Rathgeber und Photographische Rundschau

Rheinischer Camera-Club, Mainz. Address: Rheinischer Camera-Club, Mainz. Organ: Photographische Mittheilungen.

Photographische Gesellschaft in Mannheim, Mannheim Address: Gustav Spangenberg, Mannheim, J. 1. 6. Organ: Photographische Rundschau.

Mittweidaer Camera-Club, Mittweida. Address: Mittweidaer Camera-Club, Mittweida, Rochlitzerstrasse 74.

Camera-Club München, München. Address: Camera-Club München, Restaurant Platzl. Organ: Photographische Mittheilungen.

Club der Amateur Photographen in München (E. V.), München. Address: Franz Hofer, München, Sommerstr. 23 I. Organ: Photographische Rundschau.

Photographischer Club in München, München. Address: Fd. Rau, München, Kaufingerstr. 9. Organ: Photographische Mittheilungen.

Verein von Freunden der Photographie in Nürnberg, Nürnberg. Address: Major Höhn. Nürnberg. Spittlerthorgraben 19. Organ: Photographische Rundschau, Photographisches Centralblatt.

Freunde der Photographie, Offenbach a. M. Address: Christoph Eberle, Offenbach a. M., Ludwigstr. 88. Organ: Apollo.

Photographischer Verein in Posen, Posen. Address: Photographischer Verein in Posen. Organ: Photographische Mittheilungen.

Photographische Gesellschaft in Regensburg, Regensburg. Address: Wilh. Ostermeyer, Bautechniker, Pfaffenstein bei Regensburg (Post Stadtamhof).

Photographische Gesellschaft in Remscheid, Remscheid. Address: J. Koch, Jr., Remscheid, Brüderstr. 4. Organ: Praktischer Rathgeber.

Amateur-Photographen-Vereinigung für Rendsburg und Umgegend, Rendsburg. Address; F. Wackerhagen, Dampf-Möbelfabrik, Rendsburg, Grüne Strasse. Organ: Apollo.

Amateur-Photographen-Verein "Gut Licht" Rixdorf, Rixdorf bei Berlin. Address: Amateur-Photographen-Verein "Gut Licht" Rixdorf, Rixdorf bei Berlin. Organ: Apollo, Photographische Mittheilungen.

Photographische Vereinigung Sangerhausen. Sangerhausen. Address: Ingenieur H. Pfeiffer, Schriftführer. Sangerhausen, Neuendorf 10 II. Organ: Rathgeber für Amateur-Photographen, Apollo.

Freie Vereinigung von Freunden der Photographie, Schweldt a. d Oder. Address: Freie Vereinigung von Freunden der Photographie, z. H. des Herrn Rud. Martens, Schweldt a. d. Oder. Organ: Photographische Rundschau.

Dunkelkammer. Verein für Lichtbildkunst in Siegen. Address: H. Dorlemann, Kirchen a. d. Sieg. Organ: Lechners Mittheilungen.

Vereinigung Sonneberger Amateur-Photographen, Sonneberg (S.-M.). Address: Ernst Geldhäuser, Sonneberg (Sachs -M.), Unt. Graben.

Section Steglitz der Deutschen Gesellschaft von Freunden der Photographie, Steglitz bei Berlin. Address: Paul Gebhardt, Steglitz, Schlossstr. 113 III. Organ: Photographische Rundschau.

Amateur-Photographen-Verein zu Stettin, Stettin. Address: K. Albrecht, Stettin, Blumenstr. 4. Organ: Photographische Rundschau.

Verein der Freunde der Photographie in Stettin, Stettin. Address: Apotheker K. Visbeck, Stettin, Moltkestr. 15. Organ: Photographische Mittheilungen.

Photographischer Club Strassburg (E.), Strassburg (E). Address: Dr. S. Hausmann, Strassburg (E.), Gailerstr. 1. Organ: Photographische Rundschau.

Verein für Liebhaber-Photographie Stuttgart, Stuttgart. Address: 1. Schriftführer K. Stahlecker, Kgl. Revisor, Stuttgart, Hegelstr. 45. Organ: Photographische Rundschau.

Polytechnischer Verein, photogr. Abtheilung, Tilsit. Address: Justizrath Ostermeyer, Tilsit, Hohestr. 46. Organ: Photographische Rundschau.

Photographische Gesellschaft Waldenburg (Schl.), Waldenburg (Schl.). Address: A. W. G. Schröder, dipl. Ingenieur, Waldenburg (Schlesien), Scheuerstr. 5. Organ: Photographische Mittheilungen.

Amateur-Photographen-Club Weiden, Weiden (Oberpfalz). Address: Friedrich Schnee, Weiden (Oberpfalz). Organ: Rathgeber für Amateur-Photographen.

Wiesbadener Amateur-Photographen-Verein, Wiesbaden. Address: Ingenieur Ernst Emminghaus, Wiesbaden, Schiersteinerstr. 9. Organ: Photographische Rundschau

Vereinigung der Amateur-Photographen zu Worms a. Rh., Worms a. Rh. Address: Fr. Martenstein, Worms a. Rh , Alzeyerstr. 15. Organ: Photographische Rundschau, Photographische Mittheilungen.

Photographischer Club Würzburg (E. V.), Würzburg. Address; Max Michel, Zahnarzt, Würzburg, Wilhelmstr.

Amateur-Photographen-Vereinigung, Zabrze (Ob.-Schl.). Address: z. H. des Herrn Chefchemiker Söwy in Zabrze (Ob.-Schl.), Donnersmarckhütte. Organ: Apollo, Photograph.

AUSTRIA.

Amateur-Verein Helios in Angern, Angern (Nieder-Oesterr.). Address: Amateur-Verein Helios, Angern (Nieder Oesterr.). Organ: Photographische Correspondenz

Amateur-Photographen-Verein, Linz a. d. Donau. Address: Amateur-Photographen-Verein, Linz a. d. Donau. Organ; Photographische Mittheilungen.

Club der Amateur-Photographen in Prag, Böhmen. Address: Cesky Klub fotografů amáterů v. Praze. Organ: Fotograficky Obzor.

Club deutscher Amateur-Photographen in Prag, Prag. Address: Club deutscher Amateur-Photographen, Prag II, Gerstengasse 24, z. H. des Präsidenten. Organ: Photographische Rundschau, Lechners Mittheilungen aus dem Gebiete der Photographie.

Club der Amateur-Photographen, Salzburg. Address: Club der Amateur-Photographen, Salzburg, Ernst-Thun-Strasse 13. Organ: Photographisches Centralblatt.

Camera-Club in Wien, Wien. Address: Camera-Club, Wien III, Lagergasse 3. Organ: Photographisches Central latt.

Wiener Photo-Club, Wien. Address: Wiener Photo-Club, Wien I, Renngasse 14. Organ; Photographische Correspondenz.

Leseverein der Eisenwerks-Beamten, Witkowitz (Mähren). Address: Leseverein der Eisenwerks-Beamten, Witkowitz (Mähren). Organ: Photographische Rundschau.

Photographic Schools of Instruction.

AMERICAN.

American School of Art and Photography, Scranton, Pa. (Correspondence.)

Ann Arbor University, Michigan. *Director*, Prof. A. B. Stevens. Theory and Practice; Special Instructions in Photo-micrography; Lectures on Photo-mechanical Processes. It is obligatory for the students to have passed two courses in Chemistry. Examination and Diplomas.

Columbia University, New York, N. Y. Practical Instruction is given to a limited number of men in the Photographic Laboratories of the College, in the Technique of Photography, Photo-micrography, and Skiagraphy for Scientific Purposes. The time necessary for the acquirement of this technique varies with the facility of the student and he hours devoted to the theme, and is subject to special arrangement. The facilities of these Laboratories may be drawn upon for purposes of record and illustration by Instructors in various Departments of the College and by others. *Instructor*, Ed. Leaming, M. D.

Cornell University, Ithaca, N. Y. *Instructors*, Assistant Professor Moler and Messrs. Hotchkiss and Sharp. One lecture a week, with Laboratory practice, during the spring term. An advanced course in Problems in Photography is also offered. A certain knowledge of Chemistry and Physics is obligatory. Courses only open to students taking the usual amount of other work.

Guerin College of Photography, St. Louis, Mo. Practical Instructor and Studio Practice for Professional Work. *Proprietor*, F. W. Guerin.

Illinois College of Photography, Effingham, Ill. Practical Instruction and Studio Practice for Professional Work. *Instructors*, Bissell, Raymer, etc.

Western College of Photography, Marshall, Mo. Practical Instruction and Studio Practice for Professional Work. *Instructors*, Mr. S. H. Hutchings, etc.

EUROPEAN.

Photographical Laboratory of the Polytechnicum in Charlottenburg, Berlin. Prof. Schlichting, *Director*. Prof. Dr. H. W. Vogel, *Instructor*. Chemistry, Physics, Drawing, Practical Exercises and Photo-mechanical Printing Methods.

Braunschweig Department of Polytechnical School. Prof. Dr. C. Koppe and Dr. Max Muller. Theory and Practice; Photo-micrography; Photo-grammetry.

Karlsruhe, Baden. Prof. Dr. Schuberg. Theory and Practice in Studio and Field; Lectures.

Munich, Bavaria. Dr. M. Th. Edmann. Photography Applied to the Mechanical Arts.

MUNICH, BAVARIA. School of Photographic Instruction and Experiment. Two Years' Course. *Director*, G. H. Emmerich, and seven assistants.

SCHLOSS GRÖNENBACH, BAVARIA. W. Cronenberg. Mechanical Printing Methods ; Wet and Dry Processes.

IMPERIAL POLYTECHNICUM, VIENNA, AUSTRIA. Prof. Dr. Joseph M. Eder. Elements of Photography and Photo-chemistry ; Reproduction Methods.

IMPERIAL INSTITUTE FOR PHOTOGRAPHIC PRACTICE, REPRODUCTION METHODS, AND MECHANICAL PRINTING, VIENNA, AUSTRIA. Prof. Dr. Joseph M. Eder, *Director*. Profs. Hans Lenhardt, Alex. Lainer, I. Hörwarter, C. Jasper, *Instructors*. Two Courses of Instruction. Drawing ; Chemistry ; Optics ; Theories of Photographic Processes ; Retouching Positives.

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Copyrights shall be granted for the term of twenty-eight years from the time of recording the title thereof.

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List of the Countries with which the United States have Established Copyright Relations.

July 1, 1891.—Belgium, France, Great Britain and her possessions, and Switzerland.
April 15, 1892.—Germany.
October 31, 1892.—Italy.
May 8, 1893.—Denmark.
July 20, 1893.—Portugal.
July 10, 1895.—Spain.
February 27, 1896.—Mexico.
May 25, 1896.—Chile.
October 19, 1899.—Costa Rica.
November 20, 1899.—Netherlands (Holland) and her possessions.

Table Showing Displacement on Ground Glass of Objects in Motion.

By Henry L. Tolman.

[Republished, with corrections, from the *Photographic Times*.]

Lens 6 in. Equiv. Focus, Ground Glass at Principal Focus of Lens.

Miles per Hour.	Feet per Second.	Distance on Ground Glass, in inches, with Object 30 Feet away.	Same with Object 60 Feet away.	Same with Object 120 Feet away.
1	1½	.29	.15	.073
2	3	.59	.29	.147
3	4½	.88	.44	.220
4	6	1.17	.59	.293
5	7½	1.47	.73	.367
6	9	1.76	.88	.440
7	10½	2.05	1.03	.513
8	12	2.35	1.17	.587
9	13	2.64	1.32	.660
10	14½	2.93	1.47	.733
11	16	3.23	1.61	.807
12	17½	3.52	1.76	.880
13	19	3.81	1.91	.953
14	20½	4.11	2.05	1.027
15	22	4.40	2.20	1.100
20	29	5.87	2.93	1.467
25	37	7.33	3.67	1.833
30	44	8.80	4.40	2.200
35	51	10.27	5.13	2.567
40	59	11.73	5.97	2.933

Hotels Having Dark-Rooms for the Convenience of Tourist Photographers.

CALIFORNIA.

East Pasadena—The Raymond.
Monterey—Del Monte.
Santa Barbara—San Marco.
San Diego—Hotel Coronado.
San Rafael—Hotel Rafael.
The Geysers, Sonoma Co.—The Geysers.
Santa Cruz Mountains—Mountain View Ranch. An elaborate dark-room, with all requisites.

NEW YORK.

Adirondacks—Cascade Lake House. Has a dark-room with running water.
Big Indian, Catskill Mountains—Slide Mountain House.
Blue Mountain Lake, Hamilton County—Prospect House.
Ellenville, N. Y.—Mt. Meenagha House.
Haines Falls, Green Co.—Kenwood Hotel. Room for two to work at once in dark room.
Lakewood—The Stillingsworth.
Lake George—Fort William Henry Hotel.
Lake George, Bolton—Lake View House.
Lake Minnewaska—Wildmere House.
Lake Mohonk—Lake Mohonk House.
Kidders Ferry, Cayuga Lake—Coles Hotel.
Niagara Falls—Spencer House.
Hunter—Breeze Lawn. Has a dark-room with running water.
Westport—The Westport Inn. Has a dark-room with running water.

NEW HAMPSHIRE.

Littleton—Chiswick Inn.
White Mountains—Profile House and The Flume House.
Mt. Washington—Summit House.

NORTH CAROLINA.

Hot Springs—Mountain Park Hotel.

MICHIGAN.

Oden—The Atherton Hotel.

ONTARIO.

Muskoka, Lake Joseph—The Stanley House.

PENNSYLVANIA.

Dingman's Ferry—High Falls House.
Sullivan Co.—Hotel Eaglesmere.

GEORGIA.

Savannah—Hotel de Soto.

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St. Johns—Magnolia Hotel.
Tampa—Tampa Bay Hotel.

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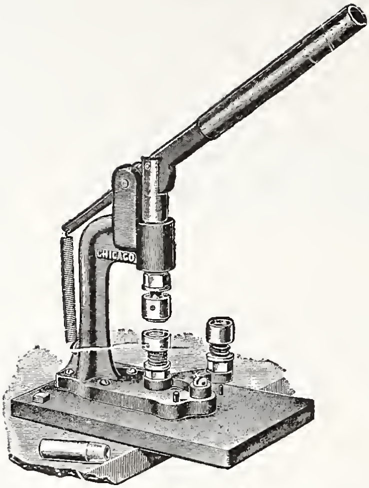
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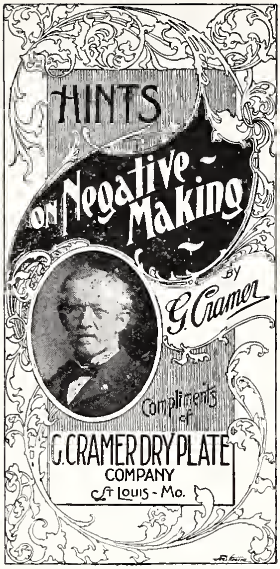

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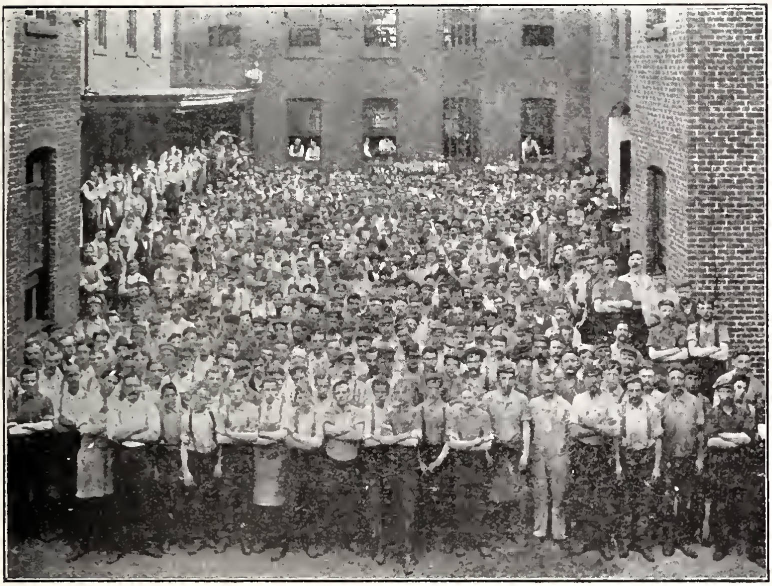

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