

Fig. 12.

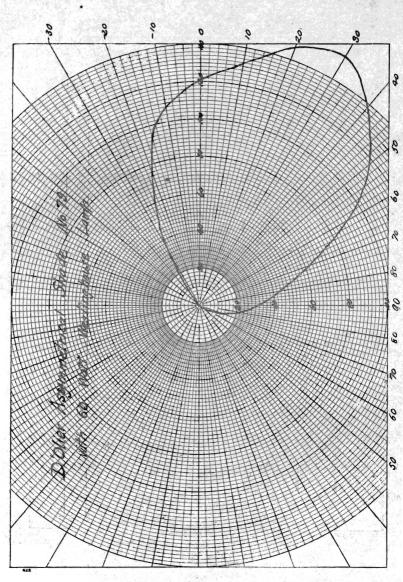


Fig. 13.

The readings were taken with a Trotter portable photometer, provided with a flicker head, and also an attachment for measuring horizontal illumination direct. The instrument contains two standard lamps, which give a measurable range of intensities from .1 to 5 foot candle.

For comparison, some figures are also given of the lighting by gas and electricity of some schoolrooms in Germany (Table IX), and of some experiments made by Messrs. Murphy and Morgan, in which one particular room was illuminated by seven different methods (Table VIII).

In conclusion, the authors desire to express their thanks to the authorities of the Public Works Department for their permission in allowing this paper to be read before the Society, and to the authors of the following publications: "Radiation, Light and Illumination," by C. P. Steinmetz; "The Subtractive Production of Artificial Daylight," by Ives and Luckiesh ("Electrical World," 4th May, 1911); "Chromatic Aberration and Visual Acuity," by Dr. Louis Bell ("Electrical World," 11th May, 1911; "Comparative Costs of Illuminants," by Bryant and Hake ("Electrical World," 29th December, 1910); "The Distribution of Energy in Spectra," by L. Gaster ("Electrician," 10th December, 1909); "Distribution and Efficiency Tests on Lamp Shades," Murphy and Morgan ("Electrical Review," July 7th and 14th, 1911; "A New Method of Measuring Intrinsic Brilliancy," Ives and Luckiesh ("Electrical World," 16th February, 1911); "Table of Illumination Requirements" ("Illuminating Engineer," April, 1911); "Illumination of Schoolrooms in Germany" ("Illuminating Engineer," May, 1911.

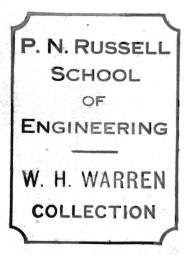


TABLE VII.
LIGHT MEASUREMENTS IN SOME GOVERNMENT OFFICES, N.S.W.

Room No.	Area square ft.	Total Watts Input	Mean ft Candles In- tensity.	Total Lumens	lent	Effici- ency of Illmina- tion per cent.	ft. per	Ceiling	Walls.	REMARKS,		
1	1800	2280	4.2	7560	930	40.7	.302	Dark	Dark	Two large chandeliers in centre of room, with two light wall brackets; all metallic filament lamps.		
2	768	600	3.65	2410	297	45.0	.318	Light	Dark	Lamp hung from ceiling; metallic filament lamp, tip frosted.		
3	7,20	600	2.4	1440	177	29,5	.5	Light	Dark	Lamps hung from ceiling; metallic filament lamps, full frosted.		
4	330	240	3.7	1210	149	62.0	.198	Light	Med.	Lamps hung from ceiling; metallic filament lamps, tip frosted.		
5	210	180	4.0	840	103	57.2	.214	Light	Med.	Lamps hung from ceiling; metallic filament lamps, tip frosted.		
6	270	240	3.25	880	108	45.0	.272	Light	Dark	Lamps hung from ceiling; metallic filament lamps, tip		
7	2016	7920	3.4	6850	844	10.6	1.16	Light	Dark	Lamps hung in bays in ceiling, with diffusing screens.  Metallic filament lamps.		
8	1750	4290	.95	1660	560	11.4	2.58	Light	Dark	Centre chandelier, with diffusing screens. Remaining lamps are two light brackets and opal shades. Carbon lamps.		
9	312	240	3.2	. 1000	123	51.3	.24	Light	Light	Lamps, half frosted, on tube pendants, metal filament lamps.		
10	295	110	1.0	110	36.3	33.0	.373	Light	Light	Inverted lighting metallic filament lamp in D'Olier shade.		
		110	1,2	132	43.5	39.6	.311	Light		,, ,, ,, ,, flat green opal shade		
		63	.05	34	20	31.6	.388	Light		,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,		
11	5285	2204	2.4	12,700	1560	70.8	.174	Light		Tube pendants, metallic filament lamps, tip frosted, in Holophane I 7 shades.		
12	1370	1080	3.9	5340	656	60.8	.203	Light	Light with d'k sp'ts	Tube pendants, metallic filament lamps, tip frosted, in Holophane I 5 shades.		
13	256	120	1.4	<b>35</b> 8	44	36.6	.335	Light		Tube pendants, metallic filament lamps, tip frosted, in Holophane I 5 shades.		

TABLE VIII. Experiments by MURPHY & MORGAN.

1.	2.	3.	4.	5.	6.	7.	8.	9
Ref. No.	Maximum illumination, ft. candles.	Minimum illumination, ft. candles.	Mean illumination, ft. candles.	Magnification of illumination due to shade,	Shade Efficiency.	Illumination Efficiency.	Diversity Factor.	REMARKS.
I.	3.87	2.10	2.88	1.00	100°/。	32,2°/。	1.84	Ceiling and walls well illuminated, glare from lamps consider- able.
п.	6.44	2.84	4.21	1.46	81.3°/。	46.8°/。	2.27	Lamps fitted at height recommended by shade makers.
ΪΠ.	5,85	2.86	3.92	1.36	82.1°/。	43.7°/。	2.04	Ceiling and walls fairly bright, lamp fila- ments entirely screened.
IV.	6.08	2.84	4.38	1.52	82.1°/。	48.8°/。	2.14	Ceiling only slightly illuminated, glare worse than III. but not excessive.
v.	5.01	2.63	3.84	1.33	57.8°/。	42.8°/。	1.9	Ceiling quite dark, illumination very uniform.
VII.	2.43	-954	1.5	-	_	39.5°/。	2.55	Excellent general illumination, no glare, very soft shadows.

<sup>\*</sup> Illumination efficiency = Useful light at table level. Total light produced by lamps.

I. Bare Lamps. Lamps with Holophane Reflector (Intensive). II.

,, (Semi extensive). 10" x 5" Conical Opal Shades. III.

IV.

VI. Iron (Enamelled). Silvered Glass Reflector."

Semi Indirect Lighting (3 lamps in opal glass bowl). VII.

## TABLE IX.

## ILLUMINATION IN SCHOOLROOMS IN GERMANY.

(Based on figures derived from data presented by the Munich Commission and other authorities, and tabulated in Grundzuge der Beleuchtungstechnik (L. Bloch), p. 124).

Nature of	of ps.	rer med mp.	Area ft.)	tts per foot ox.)	tts per t per idle,	Illun	Diver- sity co- efficient		
Lighting.	No. of Lamps,	Power consumed per lamp.	Floor Area (sq. ft.)	Total watts per square foot (approx.)	Total watts per sq. foot per ft. candle,	Mean.	Max.	Min.	Max, Min.
ELECTRIC.	1.4 54	Watts.		- 1		193			
D. C. Arc Lamps,	3 2 2	770 550 605	1,700 780 1,040	1,35 1.4 1.2	$0.23 \\ 0.27 \\ 0.21$	5.7 5.2 5.7	6.9 7.0	4.6 3.5	1.5 1.95
Vertical Carbons.	2 4 2 3	540 550 735	1,650 780 1,700	1.3 1.4 1.3	0.32 0.33 0.15	4.0 -4.2 8.9	5.5 5.8 11.2	2.45 2.45 6.7	2.2 2.4 1.7
D. C. Inverted Arcs.	2 2	715 650	1,700 780	1.25 1.7	0.155 0.245	8.0 6.9	9.7 11.0	6.3	1.55 3.0
July 21 1 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Consumption in cub. ft. per hour per lamp,	s, Co	Total consump- tion cub. ft. per hour per sq. ft.	Total consumption cub. ft. per hr. per sq. ft. per ft. candle.	173.8			
Ĝas.			4			ÿ., į			Med
Low Pressure }	52 14	3.8 4.2	1,700 1,040	0.12 0.06	0.016 0.0145	7.4 4.1	8.6	6.0	1.4
$\left\{\begin{array}{c} \mathbf{High  Pressure} \\ \mathbf{(Selas).} \end{array}\right\}$	10	13.2	1,700	0.08	0.011	7.0	8.0	6.1	1.3
High Pressure (Millenium).	8 6	17.1 8.6	1,700 840	0.08 0.06	$0.0115 \\ 0.0095$	6.9 6.2	8.5 6.7	5.8 5·3	1·45 1·25