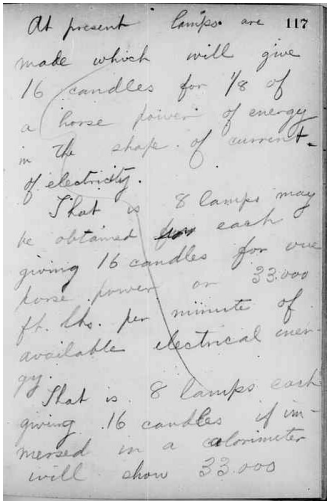
–1991–

Notebook Entry: Electric Lighting


At present lamps are 117
make which will give
16 candles for 1/8 of
a horse power of energy
in the shape of current
of electricity.
That is 8 lamps may
be obtained ~~for~~ each
giving 16 candles for one
horse power or 33,000
ft. lbs. per minute of
available electrical ener-
gy. That is 8 lamps each
giving 16 candles if im-
mersed in a calorimeter
will show 33,000

[Menlo Park, c. September 25, 1880[1]]

At present lamps are made which will give 16 candles for ⅛ of a horse power of energy in the shape of current of electricity.

That is 8 lamps may be obtained ~~for~~ each giving 16 candles[a] for one horse power or 33,000 ft. lbs. per minute of available electrical energy.

That is 8 lamps each giving 16 candles if immersed in a calorimeter[a] will show 33,000 ft. lbs per minute given to the water in heat.

The life of these lamps will average 600 hours giving 16 candles, that[a] is if 10 000 lamps are lighted and a record kept of the hours that they gave light the sum total of the burning time of[b] all the lamps would be 6 000 000 hours

At 8 per horse power of 16 candles the light is estimated as costing the company ¼ ct per hour. [~~if?~~][c] that is[d] for 600 hours

	~~$1.50~~ $1.50
Cost lamp	.35
	$1.85

For 10,000 lamps

For power	$15,000
For lamps	3,500
	18,500

Received from these at $1.50 per M

$45,000
18,500
Profit $26,500

At 9 per horse power there cane be obtained from the same plant ⅛ more lights

8 | 10,000
1,250[a]
11,250 lights[2]
.35 lamps
56,250
33,750[a]
3,937.50

[For power] 15,000.
[For lamps] 3,937.50
$18,937.50

Receipts 45,000
7,375[3]
52,355[a]

$52,355
18,937.5
$33,417.5
26,500
Increase Profits $ 6,917.5

128 ÷ 8 = 16[e] candles in eight places for a H.P. of current.[f]
128 ÷ 12 = 10.7[e]
10 per H.P. 12 candles each[g]
10 per H.P 12 candles each
¼ × 8 = 2 cts per hour
2 cts per hour 600 hours
$12.00 for 10 lamps horse power
3.50 for 10 lamps cost
$15.50

$1.55 per lamp cost to company
11 lamps for 1 Horse power
11 lamps for ~~$.02 cts$~~ .02 cts
600
$12.00
3.85[4]
11 | $15.85
$1.44

1.55
1.44
11 cts gain per lamp
½ 5.5 cts to be added[a] to price
⅕ 2.2 cts[g]
Company sells 10 lamps

Tests show that 10 lamps of 12 candles each may be obtained from each ~~Electrical~~[h] horse power of electricity.[a] That is if such a lamp were, when giving 12 candles, immersed in a vessel of water, the water would rise in temperature at a rate indicating that 3300 ft. lbs of energy were added to it every minute in heat.

Such a lamp will last on a average 600 hours

That is, if 10,000 lamps were lighted at irregular or regular intervals and a careful record were kept of the time that each lamp was giving 12 candles of light, and after every lamp had ceased to give light these various burning times were summed up, it would be found that they had burned as[a] an aggregate 10,000 × 600 = 6,000,000 hours

The lamps are considered as burning an equivalent to[i] 12 candle gas, that is each one giving 12 candles may be thought as taking an equivalent of five cubic feet of gas for each hour that they are burned.

This unit is taken as it is found by experience that the devices by which the light may be made so much more ~~effect~~ practically effectual add so much to the apparent light that every[one] is satisfied when told that it is giving a good gas jet. Also that gas cannot be burned in practice so as to give out the maximum of light show by the photometer[5j] while the electric light ~~must give the consumer as much as does the tester at the laboratory~~ of 12 candles photometric value will give at least 16 to 18 candles of effective light as Compared with gas[k]

X, NjWOE, Lab. N-80-08-00:117–21, 123, 122, 125–33 (*TAEM* 36:695–703; *TAED* N110:58–66). Written by Francis Upton. Every page except 122 canceled by single vertical line. Miscellaneous intermediate mathematical operations omitted; some commas inserted in numerals in calculations for clarity. [a]Obscured overwritten text. [b]"the burning time of" interlined above. [c]Canceled. [d]"that is" interlined above. [e]Form of equation altered. [f]This line to "$1.55 per lamps cost to company" comprises page 122; not canceled. [g]Followed by dividing mark. [h]Interlined above. [i]"an equivalent to" interlined above. [j]"show by the photometer" interlined above by Edison. [k]"of 12 candles photometric value . . . with gas" written by Edison.

1. The reference at the end of this document to a lower candlepower incandescent lamp providing more effective light in comparison to a gas

lamp of greater candlepower suggests that this was probably written soon after the 23–24 September gas candlepower tests at Bergmann & Co. See Doc. 1990.

2. That is, 10,000 plus one-eighth more.

3. It is unclear where Upton gets this figure for additional receipts from using 9 lamps per horsepower.

4. That is, .35 multiplied by 11.

5. That is, according to the indication of a jet photometer; see Doc. 1990 n. 6.