QUESTIONS AND ANSWERS.

T. W. asks: What is the derivation of the words "ohm," "watt," "volt," "ampére," etc., used by electricians as their units?

ANS. They are mostly derived from the names of men distinguished in their special fields of study. The unit of capacity is one farad; of resistance, one ohm; of work, one joule; of activity, one watt; of quantity, one coulomb; of current, one ampére; of magnetic field, one gauss; of pressure, one volt; and of force, one dyne, and are from the names of Michael Faraday, George S. Ohm, James P. Joule, James Watt, André M. Ampére, Chas. A. Coulomb, Carl Gauss and Volta, the Italian discoverer. The "dyne" is derived from the root word of dynamo, itself meaning force.

JOHN M. MORRIS, Hamilton, writes: I wish to know the required weight of a receiver containing stored electricity to the amount of one horse power for one hour.

ANS.—The weight of storage battery required to return the amount of power you name would be between 225 and 240 lbs. This would be sufficient weight to allow of the battery being about half discharged. It is not advisable to entirely discharge a storage battery at each time of using.

"SUBSCRIBER," Listowel, Ont., writes. Will you kindly answer the following questions in the next issue of your valuable paper: Is a compound engine, one in which the steam is exhausted from one cylinder into the other, more economical than a single cylinder engine whose cylinder is of as great capacity as the two cylinders? If so, please state the reasons why.

ANS.—It is generally conceded that a compound engine is more economical than a single cylinder, more especially when a condenser is used. Among the reasons assigned for this are the following: (1) It is possible to get a greater ratio of expansion with two cylinders than can be got with one; (2) The loss from internal condensation is very much less with the compound. Using an automatic cut-off engine with everything about her in good order (that is, no leaky valves or pistons), an indicated diagram taken with 65 lbs. steam initial pressure, and cut-off at 20 of the stroke, should give a result of about 28 lbs. of water per h. p. per hour. The water consumption in a compound engine, figured from the indicated cards in the same way, would give us at 20 cut-off, and same initial pressure, about 15 lbs. water per h. p. per hour.

USEFUL NUMBERS FOR ASCERTAINING THE AVERAGE PRESSURE OF STEAM IN AN ENGINE CYLINDER WITH ANY CUT-OFF.

BY WM. COX.

In a former number (Jan. 3, 1891) we gave a number of equivalents or useful numbers for purposes of calculation and for slide-rule practice. In the present article we give a similar series for computing the average pressure of steam in lbs. per sq. inch for the whole stroke of a piston, when the initial pressure and the portion of the stroke at which the steam is cut off are known. They are based upon the formula:

$$p = P\frac{1+H}{R}$$

in which p = initial pressure in lbs. per sq. inch, including atmosphere.

R = ratio of expansion.

H = hyperbolic logarithm of R,

and p = mean pressure during stroke in lbs. per sq. inch, including atmosphere.

No allowance is made for imperfect vacuum. If, for instance, the steam is cut off at half stroke, we have from the table initial gage point 13, and average gage point 11, and for ordinary calculations we multiply the initial pressure by the average G. P. and divide the product by the initial G. P., the quotient is the average pressure for the whole stroke, or

$$\text{Average pressure} = \frac{\text{initial pressure} \times \text{A. G. P.}}{\text{I. G. P.}}$$

For slide rule practice, for which these gage points are specially suitable, as they all fall upon *marked* divisions of the rule and slide, and require, therefore, no estimation of the intervals of the one or the other, we place the initial G. P. for the given cut-off on scale *C* of the slide, so that it coincides with the average G. P. on scale *D* of the rule. We then have on the slide a series of initial pressures, and coinciding with the same, a series of average pressures on the rule, all corresponding with *the given cut off. The diagrammatical demonstration is* as follows:

C	Set initial G. P. for given cut-off	Under initial pressure.
D	To aver. G. P. for given cut-off	Find average pressure.

Example. Given an initial pressure of 75 lbs. per sq. inch, with the steam cut off at three-quarters of the stroke, what is the average pressure for the whole stroke?

$$\text{Average pressure} = \frac{75 \times 53}{55} = 72.27 \text{ lbs.}$$

On the slide rule,

C	Set 55	Under 75 lbs.
D	To 53	Find 72.27 lbs. average pressure.

Portion of stroke at which steam is cut off.			Initial G. P.	Average G. P.
		7/8	250	248
		3/4	55	53
		5/8	37	34
		1/2	13	11
		3/8	31	23
		1/4	57	34
		1/8	65	25
	9-10	—	200	199
	8-10	—	139	136
	7-10	—	139	132
	6-10	—	167	151
	4-10	—	214	164
	3-10	—	30	152
	2-10	—	46	24
	1-10	—	100	33
5-6	——	—	68	67
4-6	——	—	80	75
2-6	——	—	10	7
1-6	——	—	43	20

NOTE. These gage points are intended for the Manuheim slide rule, scale *C* on the slide and scale *D* on the rule, being both graduated alike.—*Engineering News.*

NOTES.

The Montreal boiler shops are said to be filled with orders at present.

A boiler in use in Daniel Reichert's brickyard at St. Clement's, Ont., exploded a few days ago, seriously injuring the son of the proprietor and killing instantly a sixteen year old lad named Mickens.

Line shafting should never be placed along the side of a room so that all the machinery will be belted from one side. Equalize the strain on the shaft by putting the machines on both sides. For this reason the shaft should be run through the center of the room.

The experimental section of the Magdeburg society of boiler users communicates the fact that ordinary cement made into a stiff paste with water (so that it adheres to a vertical wall) is admirably adapted for closing the manholes of boilers, and holds the two surfaces well together. The cement becomes sufficiently hard in 8-12 hours, and can then be submitted to pressure.

At a meeting of Toronto Branch No. 1, Canadian Association of Stationary Engineers, held on June 26th, the following officers were elected for the ensuing year. President, A. E. Edkins, Vice-President, W. Lewis, Recording Secretary, W. G. Blackgrove, Financial Secretary, E. Phillip; Treasurer, W. Sutton; Con., W. Butler; Door Keeper, C. Mosely; Trustees, A. E. Edkins, W. Sutton, S. Thomson.

Boiler users who desire simple tests for the water they are using, will find the following compilation of tests both useful and valuable: To test for hard or soft water, dissolve a small piece of soap in alcohol, and let a few drops of the solution fall into a glass of the water. If it turns milky, it is hard water, if it remains clear, it is soft water. To test for earthy matters or alkali, take litmus paper dipped in vinegar, and if, on immersion, the paper returns to its shade, the water does not contain earthy matter or alkali. If a few drops of syrup be added to a water containing an earthy matter, it will turn green.

Notwithstanding the many years the steamboiler has been under observation, there are conditions of steam making which play strange tricks, as indicated by the steam guage, the pressure, without any discoverable cause, at times increasing 40 to 50 degrees in as many seconds, and not infrequently leading to disaster. In a big electric light station in Philadelphia there has recently occurred a series of mishaps to the boilers extending over a period of *12 or 14 months, the strongest bolts being inadequate to keep the heads* and headers intact. Experts have examined and studied, but without being able to agree upon the cause, and though a coroner's jury, made up of boilermakers and engineers, called to inquire into the cause of an explosion which killed one man and frightfully scalded two others, brought in a verdict against the electric company, it was unable to explain wherein there had been want of precaution, or point out the safeguards required to prevent a similar occurrence.—*Scientific American.*