Simple engine.—Boiler pressure 150 lbs.; two cylinders 17×24 in.; wheels, 72 in. diameter. The effective cylinder pressure will be c × boiler pressure; then—

$$\text{Tractive power} = \frac{17^2 \times 24}{72} \times c \times 150 = 14,450 \times c.$$

Compound engine.—Boiler pressure 180 lbs. Intermediate pressure 70 lbs., (difference 110 lbs.), stroke of cylinder as in simple engine, 24 in. Wheel 72 in. Let x represent the diameter of high pressure cylinder, then—Tractive power $= \frac{1}{2}\frac{x^2 \times 24}{72} \times c \times 110 + \frac{1}{2}\frac{2x^2 \times 24}{72} \times c \times 70 = x^2 \times 42c$; that is $14,450c = x^2 \times 42c$.

$x^2 = \frac{14,450}{42} = 344$; therefore $x = 18\frac{1}{2}$ inches, or desired diameter of high-pressure cylinder; and $\sqrt{2 \times 18.5^2} = 26.1$ inches, or diameter of low-pressure cylinder.

He goes on to say that perhaps this method of estimating the diameters of compound cydinders may give slightly too large a result; for the average effective pressure in both may approximate nearer to the maximum effective pressure therein than in the simple engine, without running the risk of drawing fire through the tubes by a too violent blast.

M. Ch. Baudry, of the P. L. and M. Railway (Chemins de Fer de Paris a Lyons et a la Mediterranee), has given much attention to the compound, both as an investigator and experimenter; and his "note" on this subject is very interesting. A translation of his formulæ for relative cylinder diameters, and their cut-off ratios for varying speeds and pressures, will be found in the *Railroad Gazette*, March 7, 1890, pp. 161-2, or *National Car and Locomotive Builder*, May, 1890, pp. 75.

J. D. B.