Train resistance = 5 lbs. per ton loaded 2 contents to 1 of tare. If train is all tare, use 9 lbs. resistance instead of 5.

The increase in train resistance and decrease in tractive force of locomotive must be taken into consideration when speed is increased above eight to twelve miles per hour, as then the horse power of the locomotive is the limiting factor.

To find the Horse Power of a given locomotive, the separate items of *grate area, heating surface*, etc., would have to be known. A rough estimate of the tractive power at different speeds can however, be made from *boiler pressure, cylinders, drivers*, etc., from which H.P. can be figured. The mean effective cylinder pressure in per cent. of boiler pressure, per *Revolution* of *drivers* per minute being given, is as follows:—

MEAN EFFECTIVE CYLINDER PRESSURE (M.E.P.) IN PER CENT BOILER PRESSURE (simple engine).

Rev. per Minute.....	20	40	60	80	100	120	140	160	180
P.C. Boiler Pressure...	90	85	80	70	62	54	46	40	36
Rev. per Minute.....	200	220	240	260	280	300	320	340	360
P.C. Boiler Pressure...	32	29	26	24	23	22	20	19	18

For *Compound Engines* add 5% to these figures.

To change revolutions per minute (R.P.M.) to Miles per Hour (M.P.H.) diameter of drivers in inches being known,

$$\frac{\text{R.P.M.} \times \text{D}}{336} = \text{M.P.H.}$$

From this the M.E.P. at any speed can be found approximately, the *Tractive Power* at that speed will then be

$$\text{T} = \frac{\text{M.E.P.} \times d^2\text{S}}{\text{D}}$$

To find Horse Power at any given speed in miles per hour, multiply tractive power at that speed by the speed, and divide by 375,—

$$\text{H.P.} = \frac{\text{T} \times \text{S}}{375}$$