

e strength $\frac{1}{8}$ " plate,

per square inch
working pressure.

practical pur-

gallons equals
ighs ten (10)
r weighs one
 $\frac{1}{2}$ lbs., equals
weighs sixty-
lbs. 1,728
a cubic feet

c.

, add 37 to
the proper

expansion.

MANUAL OF ENGINEERS' CALCULATIONS.

35

Tensile strength: If a bar, 1" square, of iron is torn asunder by a strain of 4,500, what force will be required to break a bar 3" square?

$$\begin{array}{rcl} 1'' & : & 3^2 \\ 1 & : & 9 \end{array} \quad \begin{array}{rcl} :: & 4,500 \\ :: & 4,500 \\ & 9 \end{array}$$

$$\begin{array}{r} 1) 40,500 \\ \hline \end{array}$$

40,500 lbs.

Calculate the weight of an iron ball six inch by six inch diameter.

$$\begin{array}{rcl} 6'' & & .1377 \text{ constant number} \\ 6'' & & 216 \\ \hline 36 & & 8262 \\ 6 & & 1377 \\ \hline 216 & \text{cube of ball.} & 2754 \end{array}$$

29.7432 lbs. weight.

Now as this is only a little over one quarter of a pound too heavy, it may be used with a good deal of certainty when scales are not handy, or the ball not easy to remove, etc.; for a 6"x6" iron ball weighs by scale 29.484 lbs. and by calculation 29.7432 lbs., showing a little over a quarter of a pound in error.

To what height must a safety-valve, 8" diameter, be lifted to allow a free escape of steam equal to area of valve?

Rule :

$$\frac{d^2 \times .7854}{d \times 3.1416} = \frac{d}{4}$$

$$8 \times 8 = \frac{64 \times .7854}{8 \times 3.1416} = \frac{50.2656}{25.1328} = 2'' \text{ or } \frac{8}{4} = 2'' \text{ height.}$$