

**To Ascertain the Weight that may be safely borne by Columns of various Dimensions and Materials.**

**RECTANGULAR COLUMNS.**

$$\text{Cast Iron, } \frac{16000 \, l \, b^2}{4 \, b^2 + \cdot 18 \, l^2} = W.$$

$$\text{Wrought Iron, } \frac{18000 \, l \, b^3}{4 \, b^2 + \cdot 16 \, l^2} = W.$$

$$\text{Oak, } \frac{4000 \, l \, b^2}{4 \, b^2 + \cdot 5 \, l^2} = W.$$

**SOLID CYLINDERS.**

$$\text{Cast Iron, } \frac{10000 \, d^4}{4 \, d^2 + \cdot 18 \, l^2} = W.$$

$$\text{Wrought Iron, } \frac{11200 \, d^4}{4 \, d^2 + \cdot 16 \, l^2} = W.$$

$$\text{Oak, } \frac{2500 \, d^4}{4 \, d^2 + \cdot 5 \, l^2} = W.$$

**HOLLOW CYLINDERS.**

$$\text{Cast Iron, } \frac{16000 \, D^4 - d^4}{4 \, D^2 + \cdot 18 \, l^2} = W.$$

$$\text{Wrought Iron, } \frac{11200 \, D^4 - d^4}{4 \, D^2 + \cdot 16 \, l^2} = W.$$

$$\text{Oak, } \frac{2500 \, D^4 - d^4}{4 \, D^2 + \cdot 5 \, l^2} = W.$$

$l$  represents the length in feet,  $b$  the breadth, and  $D$  and  $d$  the diameter in inches, and  $W$  the weight in pounds.

**EXAMPLE.**—What are the crushing weights that may be safely borne by a cast iron, wrought iron, and oak rectangular column 2 in. square and 5 ft. in height?

$$\frac{16000 \times 5 \times 2^3}{4 \times 2^2 + (\cdot 18 \times 5^2)} = \frac{16000 \times 5 \times 8}{32 + 4 \cdot 5} = 17534 \text{ lbs.}$$

for the cast iron.

$$\frac{18000 \times 5 \times 2^3}{4 \times 2^2 + (\cdot 16 \times 5^2)} = \frac{18000 \times 5 \times 8}{32 + 4} = 20000 \text{ lbs.}$$

for the wrought iron.

$$\frac{4000 \times 5 \times 2^3}{4 \times 2^2 + (\cdot 5 \times 5^2)} = \frac{4000 \times 5 \times 8}{32 + 12 \cdot 5} = 3596 \text{ lbs.}$$

for the oak.

**Table exhibiting the Relative Value of various Woods, their Crushing Strength and Stiffness being combined.**

Spanish Mahogany	2571	American Spruce	2522
Teak	6555	Walnut	2378
English Oak	4074	Yellow Pine	2193
Ash	3571	Larch	1897
Elm	3468	Sycamore	1833
Beech	3079	Poplar	975
Quebec Oak	2927	Cedar	700

**Comparative Strength of Long Columns of various Materials.**

Cast Iron	1000	Oak	108.8
Wrought Iron	1745	Pine	78.5
Cast Steel	2518		Artizan.

**STEAM ON COMMON ROADS.**—On the 21st ult., a heavy marine boiler was successfully removed from the works of Messrs. John Laird, Sons, and Co., Birkenhead, to the large crane situate on the margin of the Great Float, by means of Taylor's (Britannia Engine Works) "steam elephant," and a second boiler was removed on the 24th ult. This is the first instance in this neighbourhood in which steam on common roads has been employed for such a purpose. Judging from the easy manner this machine was guided over roads in a very indifferent state, and the distance it had to travel, it promises to become a most useful agent for transporting heavy loads, and it is equally applicable for discharging timber out of ships and afterwards drawing it upon the quay or from place to place, as required. One of these engines, manufactured by Messrs. J. Taylor & Co., of Birkenhead, has been at work for this purpose in her Majesty's dockyard at Devonport, for upwards of two years, with great success.—*Artizan.*

**BRITISH SHIPS AND BRITISH SEAMEN.**—The mercantile marine of the British Empire consists of 35,501 vessels, measuring 5,710,968 tons, and navigated by 294,460 seamen. The various divisions of the United Kingdom, and the British Possessions abroad, furnish the annexed figures in connection with the preceding statement:—

	Vessels	Tons.	Crews.
England	21,007	3,709,615	168,415
Scotland	3,486	623,791	31,682
Ireland	2,271	253,336	14,109
Guernsey, Jersey and Isle of Man	899	71,045	5,591
British Possessions...	10,338	1,052,281	74,663

Total..... 38,501 5,710,968 294,460  
Of the above vessels, 2,337, with 500,144 of tonnage, are propelled by steam.

**Lucifer Matches.**

Mr. Gore, a recent writer on this subject, gives some interesting statistics respecting this branch of manufacture. The firm of Messrs. Dixon employ 400 workmen, and generally have on hand £8,000 or £10,000 worth of timber. Each week they consume one ton of sulphur and make 43,000,000 matches, or 2,160,000,000 in the year. Reckoning the length of a match at two and a quarter inches, the total length of these would far exceed the circumference of the earth. Another calculation has been made, that the whole length of waxed cotton wicks consumed every year by one London manufacturer in the production of "vestas," would be sufficient to reach from England to America and back again. The magnitude of the figures relating to the English manufacture of matches is, however, insignificant, when we turn to the Austrian production. Two makers alone, M. Pollak, at Vienna, and M. Furth, in Bohemia, produce the amazing number of 44,800,000,000 matches yearly, consuming twenty tons of phosphorous, and giving employment to 600 persons. The low price at which these necessities of life are produced is equally astonishing. M. Furth sells his cheapest boxes at one penny per dozen, each containing eighty matches. Another maker sells the plain boxes at two pence per 100, and 1,400 matches for one farthing; whilst