

Shrinkage of Castings.

Patternmakers' rule should be for

Cast Iron	$\frac{1}{8}$
Brass	$\frac{1}{16}$
Lead	$\frac{1}{8}$
Tin	$\frac{1}{12}$
Zinc	$\frac{1}{16}$

of an inch longer per lineal foot.

To find the Weight of Casting by the Weight of a Pine Pattern.

Multiply the Weight of Pattern by

12	for Cast Iron.
13	for Brass.
19	for Lead.
12.2	for Tin.
11.4	for Zinc.

Reduction for Round Core and Core Prints.

RULE.—Multiply the square of the diameter by the length of the core in inches, and the product by 0.017 is the weight of the pine core, to be deducted from the weight of the pattern.

Weight of Grindstones.

RULE.—Square the diameter (in inches); multiply by thickness (in inches); then by the decimal .06363; the product will be the weight of the stone in pounds.

General Rule for Determining the Weight of any Piece of Wrought Iron.

One cubic foot of Wrought Iron,		
One square foot, one inch thick,		= 480 lbs.
One square inch, one foot long,		= 40 "
One square inch, one yard long,		= 34 "
		= 10 "

Then to ascertain the weight of any piece of Wrought Iron, use the following:—

RULE.—Ten times the sectional area in square inches is equal to the weight in pounds per yard

To Find the Number of Square Feet in a Circle.

Square the diameter and multiply by decimal .7854.

To Restore Burnt Steel and Weld It.

4 lbs. white sand, pulverized fine, $\frac{1}{2}$ lb. sal ammoniac, $\frac{1}{4}$ lb. copperas, $\frac{1}{2}$ lb. rosin, all pulverized and finely mixed, then use as borax.

Receipt for Welding Steel and Iron.

8 lbs. sand, 4 oz. salt, 2 oz. copperas, $\frac{1}{2}$ oz. sal ammoniac, pulverize, mix together, and use the same as any loam.

Case-Hardening.

Horn, hoof, bone dust, or shreds of leather, heated together with the article to be case-hardened, in an iron box, to a blood red heat, then immerse the article in cold water.

Some engineers cut up the shreds, etc., fine, and mix them with white wine vinegar and salt.

To Temper Springs, etc.

$\frac{1}{2}$ lb. alum, $\frac{1}{2}$ lb. borax, $\frac{1}{2}$ lb. prussiate potash, dissolved in one gallon of hot water, then add 5 gallons oil (linseed oil is best), $\frac{1}{2}$ gal. of sand, $\frac{1}{2}$ lb. pulverized charcoal, when well mixed heat and dry as usual.

Tempering Steel.

Color.	Purpose.	Temperature.	Alloy whose fusing point is of the same temp.	
		Fahrenheit.	Tin	Lead.
Light Straw.....	Turning tools for metal.....	450°	1	to 19
Dark Straw.....	Wood tools, taps and dies.....	470°	1	to 24
Brown yellow.....	Hatchets, chipping chisels.....	500°	1	to 43
Dark purple.....	Spring, etc.....	550°	1	to 12

To Mend Broken Iron.

Zinc dissolved in mercury; then take the mixture and stick the broken iron together and keep it pressed close till dry.