The Way to Zinc Cast Iron.

MESSRS. EDITORS:—For the information of E. D., and others, I place at your disposal some experiments made by myself in galvanizing small cast-iron articles such as gears and other small parts of machinery. I heated the castings to be galvanized to a red heat; I then plunged them into a bath of clear muriatic acid, to detach the scales and to thoroughly clean them; they are then immersed in a bath of melted zinc. As soon as the iron has attained the melting heat of the zinc they are removed. In this way I have made some beautiful galvanized castings. Great care should be taken, or in plunging the articles into the zinc, while wet, the zinc will be thrown in the face of the operator. The zinc should be covered with sand, and the casting must be immersed very slowly. E. H. HILL.

Worcester, Mass., Oct. 14, 1865.

Scientific American.

Japan Black.

1. Asphaltum, 3 oz.; boiled oil, 4 quarts; burnt umber, 8 oz. Mix by heat, and when cooling thin with turpentine.

2. Amber, 12 oz.; asphaltum, 2 oz.; fuse by heat, add boiled oil, half a pint; rosin, 2 oz.; when cooling add 16 oz. oil of turpentine. Both are used to varnish metals.

To Varnish Articles of Iron and Steel.

Dissolve 10 parts of clear grains of mastic, 5 parts of camphor, 15 parts of sandarach, and 5 of elemi, in a sufficient quantity of alcohol, and apply this varnish without heat. The articles will not only be preserved from rust, but the varnish will retain its transparency and the metallic brilliancy of the articles will not be obscured.

Bronze Paint for Iron or Brass.

Chrome green, 2 lbs; ivory black, 1 oz.; chrome yellow, 1 oz.; good japan, 1 gill; grind all together and mix with linseed oil.

A Metal that Expands in Cooling.

Lead, 9; antimony, 2; bismuth, 1 part. This metal is very useful in filling small defects in iron castings, &c.

Cast Iron Cement.

Clean borings, or turnings, of cast iron, 16; sal ammoniac, 2; flour of sulphur, 1 part; mix them well together in a mortar and keep them dry. When required for use, take of the mixture, 1; clean borings, 20 parts, mix thoroughly, and add a sufficient quantity of water. A little grindstone dust added improves the cement.

Paint for Coating Wire Work.

Boil good linseed oil with as much litharge as will make it of the consistency to be laid on with the brush; add lampblack at the rate of one part to every ten, by weight, of the litharge; boil three hours over a gentle fire. The first coat should be thinner than the following coats.

A New Hydraulic Cement.

At the sitting of the Academy of Sciences on the 4th instant, M. Henri Sainte Claire Deville announced that a very valuable hydraulic cement may be obtained by heating dolomite,—the abundant native double carbonate of magnesium and calcium, commonly known as "magnesian limestone,"—to between 300 and 400 deg. Centigrade, and then making it into a paste with water. The heat to which the dolomite is subjected should be above 300 deg., but should not exceed 400 deg.—*Mechanics' Magazine.*

Practical Memoranda.

Solubility of the Gases.

The following table shows the solubility of the gases named in one volume of water at 32° and at 59°:—

Gases.	At 32° F.		At 59° F.
Ammonia	1049 60	.....	727·2
Hydrochloric acid	505·9	.....	458 0
Sulphurous acid	68·861	.....	43·564
Sulphuretted hyd'n	4·3706	.....	3·2326
Chlorine	Solid.	.....	2·368
Carbonic acid	1·7967	.....	1·0020
Protoxide of nitrogen	1·3052	.....	0·07780
Olefiant gas	0 2563	.....	0·16150
Marsh gas	0·05449	.....	0·03909
Carbonic oxide	0·03287	.....	0·02432
Oxygen	0·04114	.....	0·02989
Nitrogen	0·02035	.....	0·01478
Air	0 02471	.....	0·01795
Hydrogen	0·01930	.....	0·01930

The gases thus taken up by water may all, with the exception of hydrochloric acid, be expelled by boiling. Other liquids besides water dissolve the gases with greater or less avidity, thus alcohol at 32° dissolves of sulphurous acid 328·62 times its own volume.—*Tomlinson.*

Composition of Atmospheric Air.

The average composition of atmospheric air may be thus stated:—

	Oxygen	20 61	100·00;
	Nitrogen	77·95	
	Carbonic acid	·04	
	Aqueous vapour	1·40	
	Nitric acid, Ammonia, Carburetted hydrogen,		Traces.
And in Towns.	Sulphuretted hydrogen, Sulphurous acid,		Traces.

The respiration of animals and the combustion of gas, lamps, and candles have a similar effect on the oxygen of the air; while the hydrogen of combustible bodies, uniting with another portion of the oxygen, forms vapour of water in considerable quantities—a pound of oil during its combustion giving off more than a pound of water, in addition to the carbonic acid. Animals also give off a considerable portion of vapour of water, combined with animal effluvia of a putrescent character.—*Ibid.*

Velocity of Sound.

The velocity of sound in common river water, at a temperature of 15° centigrade, is 4,700 feet a second, while at a temperature of 30° centigrade