SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.

Coating Metals: Henry Grissell's (of the Regent's Canal Iron-works) improvement in coating metals with other Metals.—Patent dated January 11th, 1851. Enrol'ed July 10th, 1851, (London Patent Journal)—The patentee's improvements in coating metals with other metals are as follows:—

Coating Iron with Zinc.—For this purpose the patentees use a bath or vessel of iron, or other suitable material, in which, by means of heat they melt the zinc, and on the surface of the melted zinc place a thick layer of chloride of zinc (prepared by dissolving zinc in muriatic acid, and driving off the water,) or a mixture composed of 8 parts of chloride of zinc, and 10 parts of chloride of potassium, or a mixture of equal parts of chloride of zinc and chloride of sodium, or chloride of potassium. When the metal and the salt are in a state of fusion, the iron to be coated with zinc is dipped into the metal, through the covering of fused salt, and becomes coated with zinc. If, however, it is found that a sufficient quantity of zinc has not adhered to the iron a small quantity of sal-ammoniac, in powder, is sprinkled over the iron, which is again dipped into the melted zinc. Under this part of their invention, the patentees claim the use of chloride of zinc applied as above mentioned in the fused state; also of the mixtures of the various salts above enumerated.

Coating Zinc, Iron coated with Zinc, or other Metal, with a Metallic Alloy.—For this purpose the patentees use a vessel of iron, or other suitable material, in which the alloy is melted. One of the alloys used by them is composed of zinc 10 parts, tin 26 parts, and lead 5 parts. A layer of chloride of zinc mixed with an equal weight of sal-ammoniac is kept in a state of fusion on the surface of the metal alloy, the temperature of which must not be carried higher than is sufficient to keep the alloy in a fluid state. The metal to be coated is dipped into the melted alloy, but not allowed to remain there longer than is absolutely necessary to receive a coating of the alloy. The patentees use also the alloy called "fusible metal," which they prefer to make as follows: bismuth 8 parts, lead 5 parts, and tin 3 parts; alloys of other compositions will do, provided that their melting points are below 400 deg. Fah. The patentees claim the use, in the manner above stated, of the alloys specified and referred to, and of the method above described for coating metals with such alloys.

Coating Iron or other Metal with Tin, or Tin alloyed with Lead.—For this purpose the patentees use a vessel of iron, or other suitable material, in which the tin alloy is melted, and on the surface of the fused metal lay a stratum of chloride of zinc, mixed with about its own weight of sal-ammoniac. The metal to be coated is then dipped into the metal liquid or alloy, until the coating is effected. The patentees state that it will be found advantageous, in the use of this and the preceding processes, to dip the metal to be coated several times, in order that it may come in contact often with the layer of fused salt; also advantageous in the preceding process to dip the iron or other metal into a hot and slightly acid solution of chloride of zinc, previous to immersion in the bath of melted metal. The patentees claim under this head of their invention, the use of a mixture of chloride of zinc and sal-ammoniac forming a saline compound, which is kept in a state of fusion on the surface of the melted tin or alloy, in the process of coating metals with other metals.

Coating Iron or other Metal with Silver, or Alloy of Silver and Copper. In this case, the surface of the iron or other metal to be coated is to be amalgamated in the usual way. The patentees prefer to use for the amalgamating process, a mixture of 12 parts of mercury, 1 of zinc, 2 of sulphate of iron, 2 of muriatic acid, and 12 of water; the mixture to be heated, and, when 200 deg. Fah., the iron to be amalgamated is placed in the mixture, and the mercury rubbed on the surface of the iron. The silver, or alloy of silver, is then melted in a crucible, placed in a suitable furnace, and the amalgamated metal is dipped into it until it has a proper coating of silver or alloy employed.

Under this head, the patentees claim the process of coating iron or other metal or silver, or alloy of silver and copper, by amalgamating the surface of the metal to be coated, and then putting it into the melted silver or alloy.

Coating Iron with Copper, Brass, or any alloy of Copper, with Zinc, Tin, or Lead—In this case, the copper or alloy used is melted in some suitable vessel, and on the surface of the melted metal is placed a layer of borosilicate of lead, (composed of 112 parts of oxide of lead, 24 of boracic acid, and 16 of silica) and when the metal and the salt are in a state of fusion, the metal to be coated is introduced through the layer of salt into the melted metal, where it is allowed to remain long enough to acquire a coating of the metal. The patentees sometimes coat the iron with zinc, or with tin, or even amalgamate its surface with mercury, in the way above mentioned, and then proceed to dip it into the melted copper or alloy. Another method of coating iron with copper or brass, is that of exposing it to the vapor of chloride of copper, by placing that substance at the bottom of a copper crucible, in the upper part of which is placed the iron to be coated. The crucible is heated to redness, in a suitable furnace, and the vapors of chloride volatilize and coat the iron with copper. If the iron thus coated with copper be placed in the upper part of a covered crucible, in which metallic zinc, covered with animal and other charcoal, is placed, and heat applied as in the above case, the vapors of the zinc rise, and coming in contact with the copper-coated iron, convert the coating of copper into brass. Instead of chloride of copper, a mixture of metallic copper and sal-ammoniac may be used, or a mixture of oxide of copper and sal-ammoniac.

The patentees claim under this head of their invention, the use of borosilicate of lead, in a fluid state, over a surface of melted copper or brass, or of the alloys above mentioned, in the process of coating iron by immersion; also, the process of coating iron by the action of fused chloride of copper, or the mixtures above named, and of coating with brass by subsequent treatment with vapors of zinc, as above mentioned. —*Silliman's Journal.*

On Rain Waters.—M. Chatin makes the following statements as results of his operations:—

1. The chlorides which abound in the rains of maritime countries, are at Paris more abundant than in the waters of the Seine whenever the wind blows from the sea.

2. Sulphates exist in a notable quantity in the rain of Paris and in that of Central France; rain waters, though generally containing less of chlorides than the waters of rivers, usually surpass the latter in the proportion of sulphates.

3. Salts of lime and soda are contained in rain waters in an appreciable quantity.

4. Rain waters are especially distinguished by containing even half a decigramme to a litre of azotized organic matter, which may be represented in its composition by a mixture of nitrate of ammonia and ulmic acid; this ingredient is found also in the lower strata of the atmosphere, (though less at Turin and on the borders of the sea than at Paris and in Maurienne,) whence it is deposited by the dews and mists, and may be separated by washing.

5. Argillaceous earths retain better than lighter soils this principle dissolved in rain waters. The atmosphere, and the rains which wash it, perform an important part in agriculture, in restoring to the soil a portion of soluble mineral and organic matters highly useful to vegetation.

Dr. Kemp's Electro-Magnetic Engine.—A summary account of this invention was given in the *Mining Journal* for the 10th of January last; and, as the subject is one of considerable importance, a more extended notice will probably be read with interest. The prodigious