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PROCESS OF PLATING METALS.

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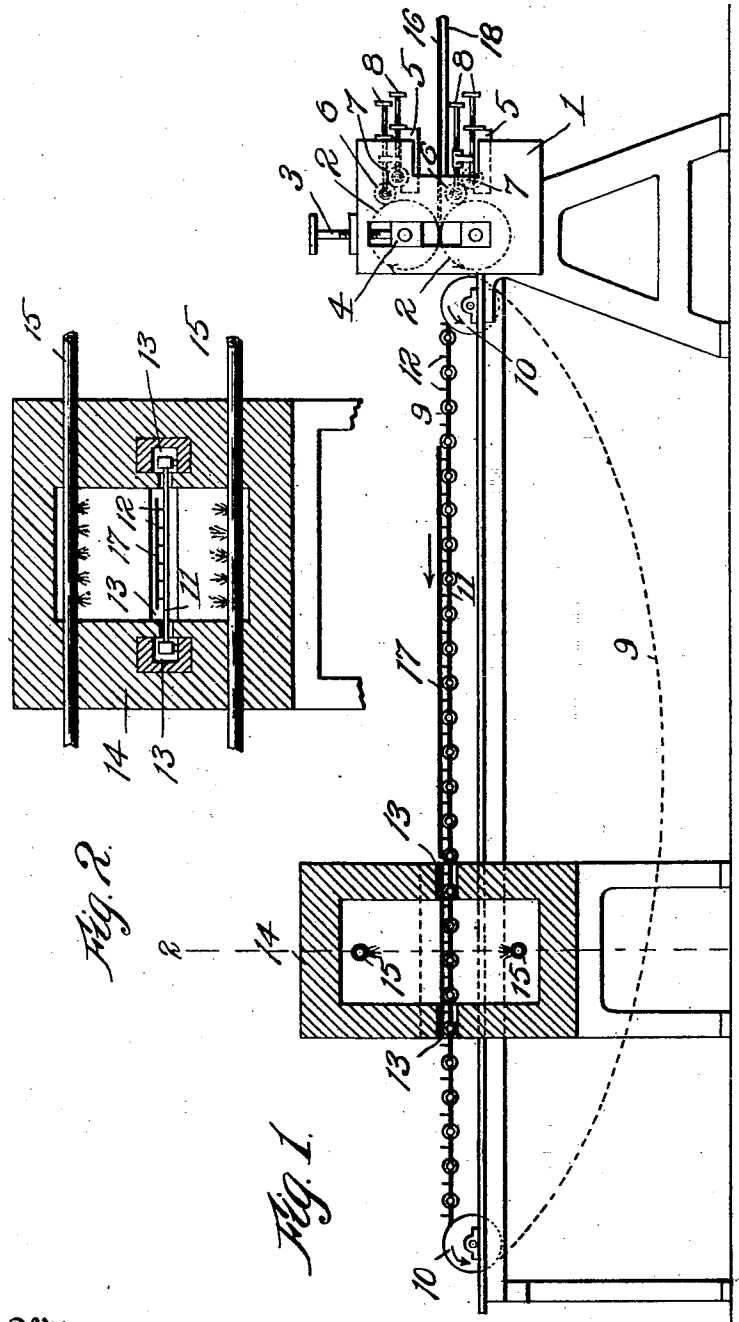


Fig. 2.

Fig. 1.

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PROCESS OF PLATING METALS.

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To all whom it may concern:

Be it known that I, WILLIAM E. WATKINS, a citizen of the United States of America, residing at New York city, borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Processes of Plating Metals, of which the following is a specification.

My invention relates generally to plating a body of one metal, such for example, as steel, with an even deposit or layer of another metal, such for example as copper.

More specifically my invention comprises a process in which a compound of the plating metal, such as oxid of copper, is so applied to a sheet or other body of metal to be plated, such as steel, as to insure an even layer containing exactly the right quantity of copper for the formation of a uniform, coherent plating of copper on said steel.

Briefly stated my improved process, in its preferred form, consists in grinding a compound of the plating metal, such as oxid of copper, to great fineness in a heavy oil or other suitable liquid vehicle so as to form a suspension or paste; then applying said suspension or paste to the face of the metal to be plated, such as a sheet of steel, in the form of a coating, by means of pressure rolls and finally subjecting such coated sheet to heat sufficient in degree and duration to produce thereon a tough, coherent and uniform plating of copper. Any oxid formed upon the copper plating may easily be removed in a suitable manner, as, for instance, by a proper solvent, such as sulfuric acid.

A convenient form of apparatus for use in practising my invention is illustrated in the accompanying sheet of drawings, in which—

Figure 1 is a diagrammatic view in side elevation and partial section, with parts broken away, and Fig. 2 is a cross section taken on line 2, 2, of Fig. 1, with parts broken away.

Throughout the drawings like reference characters indicate like parts.

1 is the main frame or housing in which are journaled a pair of rolls 2, 2, which may be forced together with any desired pressure by turning screws 3, which bear on the journal boxes 4, of the upper roll. Near each roll is located a reservoir 5, 5, for holding a supply of the suspension or paste to be applied to said roll by any convenient mechanism, such as the doctor rolls 6, 6, and intermediate rolls, 7, 7. These rolls 6, and 7, may be adjusted toward and from each other and the rolls 2, 2, by means of horizontally extending screws 8, 8. On the right hand, or intake side of the rolls 2, 2, is a feeding table 18, along which sheets of metal to be plated are fed to the rolls. On the delivery side of the rolls 2, 2, is the link belt carrier 9, running over sprocket wheels 10, 10, each link 11, of the belt 9, being provided with one or more upwardly extending, sharp-pointed projections 12, which will support the coated sheet without covering up more of the surface of the coating layer than is absolutely necessary. This endless belt conveyer 9, passes through the openings 13, 13, in the sides of furnace 14, which is simply a box of refractory material heated internally by oil burners conventionally represented at 15, 15, or by other means for producing a heated zone of the desired temperature, which should be sufficient to reduce the compound of the plating metal to metal and to unite it firmly with the metal to be plated. Where the compound employed is CuO, for example, the temperature should approximate the melting point of copper.

16, represents a sheet of steel about to be fed to coating rolls 2, 2, and 17, represents a coated sheet about to enter the furnace.

When the above described apparatus is operating to carry out my improved process, the reservoirs 5, 5, are filled with a paste or suspension formed by grinding finely the oxid of copper, or other suitable compound of the plating metal, in a vehicle of the desired consistency and viscosity. As at present advised, I believe the best results to be obtained by using a mixture of equal parts of Mexican crude oil and a native fuel oil. Mexican crude oil is particularly appropriate because it has an asphaltic base, but is frequently too viscous, so that its admixture with native fuel oil is desirable to suitably lower its viscosity. The rolls 2, 2, are rotated by any suitable power transmission apparatus (not shown) so as to feed from right to left (looking at Fig. 1). The doctor rolls 6, and intermediate rolls 7, may be so adjusted as to apply by contact any desired thickness of coating of the suspension to rolls 2, 2. When a sheet of steel 16, is fed to and through the rolls, the pressure of the rolls transfers an even, dense, compact layer of the suspension to both surfaces of

the sheet. The coated sheet emerges from the rolls onto the endless link belt carrier 9, and is carried to and through furnace 14, the endless belt conveyer being driven by power applied to the shaft of the left hand sprocket wheel 10, in any convenient manner (not shown).

While I have described the process as carried out when employing a body of iron and a coating of copper oxid to form a copper plating thereon, it may of course be applied to other metal bodies, and other oxids or compounds than those of copper may be used, and while I preferably use a mixture of Mexican crude oil and native oil in which to grind the compound of the metal to be used, because of its suitable viscosity, spreading qualities, reducing character, and cheapness, any liquid may be used which is equivalent thereto under the conditions existing during the plating operation. It is desirable that the oil or other liquid vehicle should be such as to form with the plating compound, a dense, compact coating, under the action of the pressure rolls, which coating will not be partly removed or destroyed by handling or gravity, while the coated sheet is on its way to the furnace.

By my method just such quantity of the suspension as contains the amount of metal necessary to produce a plating of a pre-determined thickness is rolled onto the sheet of steel, after which the sheet, covered with the suspension, passes through the furnace at a pre-determined speed and at a proper temperature, the whole process practically being automatic.

Having described my invention, what I claim is:

1. The process of plating one metal with another, which comprises the following steps: forming a metal-plating suspension; rolling said suspension in an even coating layer upon the metal to be plated; and subjecting the metal to be plated, together with the coating thereon, to heat, the quantity of said coating and the intensity and duration of the heat being sufficient to form a layer of the plating metal adherent to the metal to be plated.

2. The process of plating one metal with another, which comprises the following steps: forming a metal-plating suspension consisting of a reducible compound of the plating metal in a suitable reducing vehicle; applying said suspension in an even coating to the metal to be plated; and subjecting the metal to be plated, together with the coating thereon, to heat, the quantity of said coating and the intensity and duration of the heat being sufficient to form a layer of the plating metal adherent to the metal to be plated.

3. The process of plating one metal with another, which comprises the following steps: forming a metal-plating suspension by grinding a reducible compound of the plating metal in a reducing vehicle having an asphaltic base; applying said suspension in an even coating to the metal to be plated; and subjecting the metal to be plated, together with the coating thereon, to heat, the quantity of said coating and the intensity and duration of the heat being sufficient to form a layer of the plating metal adherent to the metal to be plated.

4. The process of plating one metal with another, which comprises applying to the metal to be plated, a coating of substantially uniform thickness of a paste comprising a sufficient quantity of a finely-divided compound of the plating metal mixed with a reducing liquid vehicle, and subjecting the metal and coating to a degree of heat sufficient to reduce the compound of the plating metal to metal and unite it as a plating firmly to the metal to be plated.

5. The process of plating one metal with another which comprises applying to the metal to be plated, a coating of substantially uniform thickness comprising a sufficient quantity of a viscous homogeneous suspension of a compound of the plating metal in a reducing vehicle, and subjecting the metal and coating to a degree of heat sufficient to reduce the compound of the plating metal to metal and unite it as a plating firmly to the metal to be plated.

6. The process of plating iron sheets with copper, which comprises applying to the surface of the iron sheet a coating of substantially uniform thickness comprising a sufficient quantity of a viscous homogeneous suspension of a reducible copper compound in a reducing liquid vehicle, and subjecting the metal and coating to a degree of heat sufficient to reduce the copper compound to copper and unite it firmly as a plating to the iron.

7. The process of plating iron sheets with copper, which comprises applying to the surface of the iron sheet a coating of substantially uniform thickness comprising a sufficient quantity of a viscous homogeneous suspension of copper oxid in a reducing liquid vehicle, and subjecting the metal and coating to a degree of heat sufficient to reduce the copper oxid to copper and unite it firmly as a plating to the iron.

8. The step in the process of plating one metal with another which comprises the application of a suspension compound of the plating metal to the surface of the metal to be plated by means of roll pressure.

9. The step in the process of plating one metal with another which comprises the application to the surface of the metal to be plated of a compacted coating of even thickness of a homogeneous suspension of a compound of the plating metal and a viscous fluid vehicle.

10. The process of plating metal sheets, which comprises the following steps: forming a metal-plating suspension; rolling said suspension in an even coating layer on both sides of the sheet; and subjecting the metal to be plated, together with the coatings thereon, to heat, the quantity of said coating and the intensity and duration of the heat being sufficient to form layers of the plating metal adherent respectively to opposite sides of the sheet to be plated.

11. The process of plating iron sheets which comprises the following steps: first, applying on both sides of the iron sheet a viscous, homogeneous suspension of a finely divided oxid of the plating metal in a reducing liquid vehicle; and, second, subjecting the sheet, together with the coatings thereon, to heat, the quantity of the coating and the intensity and duration of the heat being sufficient to form layers of the plating metal adherent respectively to opposite sides of the sheet to be plated.

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