UNITED STATES PATENT OFFICE.

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PLATING METALS.

SPECIFICATION forming part of Letters Patent No. 267,879, dated November 21, 1882.

Application filed July 20, 1882. (No specimens.) Patented in France May 2, 1882, and in Germany May 6, 1882.

To all whom it may concern:

Be it known that I, CARL HAEGELE, a citizen of Germany, residing at Geislingen, Kingdom of Würtemberg, German Empire, have invented new and improved processes in the manufacture of plates, bars, wires, and figure-pieces from copper alloys, iron, or steel welded with alloys, and plated or not plated with precious metals, of which the following is a specification.

This invention relates to a process of plating articles of copper, iron, or steel with brass or similar alloys of copper by placing the plating-metal upon the article to be plated, heating them together to a red heat, and then exposing them to a heavy pressure, the present invention being an improvement upon the invention shown in Letters Patent granted me July 12, 1881, No. 244,230. The articles so treated may have applied to their plated surfaces a paste of chloride of silver, tartar, and salt, and thereon a sheet of silver or gold, and then be exposed to a heavy pressure for the purpose of becoming plated with silver or gold.

As a substitute for brass and similar alloys it has been for some time attempted to manufacture sheet-iron plated with such alloys. Such manufacture has, however, not yet been practically successful, because the only manner of producing solid platings is that of welding, and the ordinary brass and similar alloys cannot be worked at the welding-temperature, and brass, which at a red heat becomes malleable, and which is but rarely used in practice, will at this temperature evolve zinc fumes to such an excess as to be but little adapted for plating.

The invention is based on the fact, first, that copper, iron, or steel can be united with brass or similar alloys if the two metals to be united are carefully cleaned and placed upon each other and heated to a red heat with the exclusion of air, and then exposed to a heavy pressure, and if the alloys are prepared in such proportion that when the same are exposed to a red heat only a very limited escape of zinc can take place; second, that the alloys which as such cannot be rolled at a red heat will under pressure at this temperature unite with copper, iron, or steel, and can then (in comparatively thin layers) be rolled out, together with the base metal, while hot.

The alloys of copper and zinc, and of copper, zinc, and nickel, are prepared according to the following formulas: first, copper-zinc alloys, containing copper from about eighty-two per cent. to ninety-five per cent., zinc from about eighteen per cent. to five per cent.; second, copper-zinc-nickel alloys, containing copper from about seventy-five per cent. to eighty-five per cent., zinc from about fifteen per cent. to five per cent., nickel from about twenty per cent. to five per cent. Small quantities of phosphorus may be added to the alloys. The percentage of nickel in formula two may be increased, with a corresponding decrease of copper; also, small quantities of tin, up to three per cent., may be added.

The process of plating and rolling is the usual one.

German silver, which can be rolled at a red heat, can be obtained by preparing alloys corresponding most nearly to the composition Cu_5Zn_4Ni, or fifty per cent. copper, forty-one per cent. zinc, and nine per cent. nickel; but this German silver, as also the above-named malleable brass of about fifty per cent. copper and forty-two per cent. zinc, because of the excessive evolving of zinc which occurs at the welding temperature, is but little adapted for plating iron, but better adapted for plating copper, either as such or as an intermediate layer in combination with iron, because of the absorption of the zinc vapors by the copper.

Ordinary brass and German silver, as already mentioned, are not adapted for plating; but alloy of copper and tin, with about twelve per cent. of tin, employing an intermediate layer of copper and aluminium-bronze containing about fifteen per cent. aluminium, is adapted for this purpose.

The production of plated sheets, rods, wires, and other articles from the above-named combination is attained by carefully cleaning the welding or contact surfaces of the lower or base plates, rods, and the like, as also of the upper or plating material, placing them one upon another, so as to exclude the air as thoroughly as possible, fastening the upper or plating material by bending over the edges, heating the packages in a reducing-flame up to a red heat, and uniting them by pressing, rolling, or drawing.

In order to produce plated sheets, the base-

sheets are rolled between grooved rollers to such a size as required, the upper or plating sheets are bent in molds into the form of covers or capsules, the edges being slightly raised, and the base-sheets are placed within the capsules and the edges of the latter pressed down by hand or by machinery, thus fastening together the base and upper sheets.

If the pressed edges are to be prevented from welding, they are moistened with glue-water to which has been added whiting.

To produce wires, the plating metal may be used in form of tubes, into which are passed the base-rods.

Moldings or ornamental pieces require base-pieces of the requisite form and size, which are covered with the plating material and heated to a red heat and then pressed in molds. The welding takes place without any solder, so that the plated articles may be subjected to pressing, drawing, and hard-soldering.

The above-named combinations are plated with precious metals, (or such alloys thereof as can be rolled,) either at once or after a preliminary heating, by rubbing the surface to be plated with a paste of chloride of silver, tartar, and common salt, whereby a silver surface is formed, on which the sheet of precious metal is spread, and the whole is then exposed to a heavy pressure. Additional combinations can be obtained from those above named, in combination with iron, by the interposition of copper or of the above-named alloys.

In Letters Patent granted as hereinbefore named I describe a mode of plating sheet-iron with copper by laying a sheet of iron upon a sheet of copper in close proximity to each other, then subjecting the united strip to a high heat, and while in such heated condition subjecting them to pressure between rollers; but since then I have discovered that by following the same process I can unite brass or similar alloys with articles of copper, iron, or steel, which is not specifically set forth in my aforesaid Letters Patent.

What I claim as new, and desire to secure by Letters Patent, is—

1. The herein-specified method of uniting brass or similar alloys with copper, iron, or steel articles, the union being effected by placing the plating metal upon the article to be plated, then heating the same to a red heat, and finally exposing the same to a heavy pressure, substantially as described.

2. The process of plating articles of copper, iron, or steel with silver or gold by first plating them with brass or similar alloys in the manner above stated, then applying to the plated surface a paste of chloride of silver, tartar, and salt, and thereon a sheet of silver or gold, and exposing the whole to a heavy pressure, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL HAEGELE.

Witnesses:
OTTO FRIELL,
OSCAR G. RUH.