

No. 625,117.

Patented May 16, 1899.

E. MARTIN.

MANUFACTURE OF COMPOUND PLATES.

(Application filed Feb. 24, 1898.)

(No Model.)

Fig. 1.

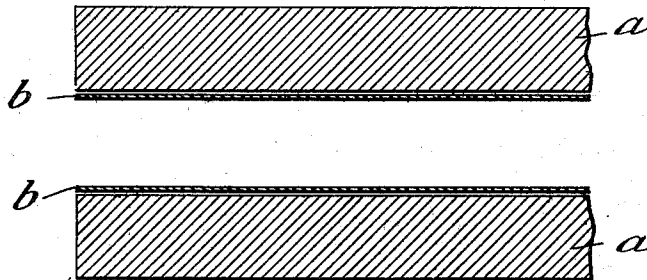
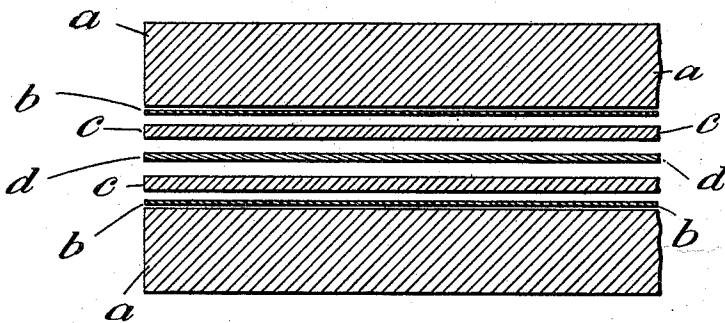


Fig. 2.



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UNITED STATES PATENT OFFICE.

EDOUARD MARTIN, OF PARIS, FRANCE.

MANUFACTURE OF COMPOUND PLATES.

SPECIFICATION forming part of Letters Patent No. 625,117, dated May 16, 1899.

Application filed February 24, 1898. Serial No. 671,503. (No specimens.)

To all whom it may concern:

Be it known that I, EDOUARD MARTIN, a citizen of France, residing at 46 Rue de Dunkerque, Paris, France, have invented a certain new and useful Manufacture of a Compound Metal of Steel and Silver, of which the following is a specification.

In the accompanying drawings, Figure 1 is a cross-section showing the steel plates and copper sheets I employ, and Fig. 2 is a similar view showing also the interposed silver sheets with their separating steel sheet.

This invention relates to the manufacture of a compound metal consisting of sheets or plates of steel and silver firmly united together.

It has not been practicable hitherto to produce a compound metal composed of sheets or plates of steel and silver so effectually united as to allow of its being bent or otherwise treated for the manufacture of articles therefrom without deterioration or separation of the two metals. By my present invention I am enabled to produce a compound metal composed of steel and silver which possesses the above-described properties. I proceed for this purpose as follows: I take bars, plates, or ingots of steel of any desired dimensions, preferably about two hundred millimeters wide by six hundred millimeters long and from fifty to one hundred millimeters thick. These plates are pickled and cleaned, so as to avoid all impurities and imperfections on the surfaces which are to receive the preparation. Upon these plates I either deposit a thin layer of copper by electrolysis, or by hydraulic pressure I apply a thin foil of perfectly pure copper. In the case of galvanic deposit I deposit, either after or before the copper coating, a thin layer of zinc or tin, either on the steel or on the copper. When this has been effected, I heat the bar, plate, or ingot to a cherry-red heat, and after placing it between two steel plates having very polished surfaces I subject it to strong hydraulic pressure. This operation has for its object to incorporate the copper and zinc or tin or the copper alone with the steel in order that in the following operation there may be no oxidation of the steel and that the united metals may when fused form a perfectly soldered or brazed union. When operating by hydraulic pressure, the

cleansed steel bars have an electrolytic deposit of zinc or tin formed upon them. I prepare an exceedingly thin foil of copper or bronze and place it on the steel plate, bar, or ingot. Upon a second prepared steel bar I place another thin foil of copper or bronze, and I then place the two bars upon each other with their copper or bronze foils in contact, these having been previously coated with flake-white in order to prevent them from uniting, and I tie the bars firmly together in order to prevent any displacement of the foils. Fig. 1 shows the two prepared steel plates or bars *a a* with their sheets of copper *b b*. After heating these combined bars, plates, or ingots to a red heat I subject them to strong pressure in a hydraulic press. By this means I obtain steel plates, bars, or ingots one side of which is adapted to receive a sheet of silver without oxidation. The above operation may also be effected by hot-rolling. The plates, &c., are then pickled and cleaned and have a sheet of silver applied thereto. This either be of pure silver or it may be alloyed with other metals for strengthening it, such as aluminium, copper, tin, zinc, but preferably nickel, in the proportion of from two to five grams of nickel to ten kilos of silver. The silver sheet having been made of a weight proportionate to the amount of silver with which a steel bar of given weight is to be coated it is carefully cleaned like the steel bar and is placed on the latter. I then place a sheet of steel, suitably coated to prevent adhesion, upon the silver, and upon the bar thus prepared I place a second bar similarly provided with a sheet of silver, and, if necessary, I combine in like manner a number of prepared bars to form a packet, the bars being so arranged that the sheets of silver are all inclosed between the steel bars in order that they may be protected from the great heat of the furnace into which the packets are then introduced. Fig. 2 shows the two copper-coated steel plates or bars *a b a b* with their silver sheets *c* separated by a steel plate *d*. When they have been highly heated, I subject the bars to considerable pressure in a hydraulic press, after which I allow them to cool. When employing a rolling-mill instead of a hydraulic press for exerting the requisite pressure, I only take two bars, with the silver

plates situated between them, so as to be protected against the very high temperature to which the steel requires to be raised for the hot-rolling operation, the heat being regulated so as to be just below the melting-point of the silver. When the packets of two bars have attained this temperature, they are passed through closed grooves of a rolling-mill exerting strong pressure thereon, whereby the silver sheets will become firmly united to the prepared surfaces of the steel bars, and I thus obtain the compound bar of steel and silver above described. The bars thus obtained are then heated and rolled out to any desired size and thickness. The steel bars, plates, or ingots may also be provided with a second sheet of silver on the opposite side.

Compound bars, plates, or ingots produced according to my above-described invention can be used for a great variety of objects or utensils for household or other purposes—such as for milk-cans, sardine-boxes, preserve-cases, cooking vessels, gridirons, molds, spoons, forks, basins, plates, &c.—also for articles used for military and naval purposes—such as flasks, pannikins, elevated quadrants for guns, armor-plates, &c.

Having thus described the nature of this invention and the best means I know for carrying the same into practical effect, I claim—

1. The method of making compound metal of steel and silver, consisting in coating two steel plates with a metal other than silver, placing the two plates together with their coated surfaces in contact, subjecting the packet thus formed to heat and pressure, separating the plates, applying sheets of silver to the coated faces, again forming a packet of the two sheets with the silver sheets innermost, and again subjecting the packet to heat and pressure; substantially as described.

2. The process of making compound metal of steel and silver, which consists in applying copper sheets to two metal plates, placing the plates together with the copper sheets in contact, subjecting the packet thus formed to heat and pressure, separating the copper-coated steel plates, applying sheets of silver to the copper-coated faces, forming a packet of the same with the silver sheets innermost, and separated by a sheet of steel, and then subjecting the packet thus formed to heat and pressure; substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDOUARD MARTIN.

Witnesses:

ANTONUS GANTCHER,
CELESTUS LAMBERT.