UNITED STATES PATENT OFFICE.

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ALLOY AND A COMPOUND FOR THE PRODUCTION THEREOF.

964,122. Specification of Letters Patent. Patented July 12, 1910.

No Drawing. Application filed November 23, 1909. Serial No. 529,519.

To all whom it may concern:

Be it known that I, WALTER RÜBEL, a subject of the Emperor of Germany, residing at Berlin, in the Empire of Germany, have invented a new and useful Method of Producing Metal Alloys and a Compound for the Production Thereof.

The present invention relates to a new method of producing metal alloys—especially those composed chiefly of copper and zinc—containing elements of those metals such as chromium, manganese, tungsten and vanadium which has less affinity for chlorin than zinc has at the fusing temperature of the chlorid of such metal. Such alloys are of high technical value and may be produced by this method at a relatively low cost.

The invention also relates to a compound to be used in the production of alloys of the character referred to. At the present time much difficulty is experienced, in the production of such alloys: and to alloy such metals as chromium, manganese, tungsten or vanadium with copper and zinc, has been found very difficult.

In carrying out my invention I first form a compound of the particular metal with zinc and then melt the alloy thus formed with the copper or other metal.

The first compound is obtained by melting a chlorid of the particular metal with a proper proportion of zinc. For example, to produce an alloy containing chromium, chromium chlorid in the proper proportion to produce the desired percentage of chromium in the final alloy is melted with zinc and the chromium liberated is alloyed in a nascent state with the zinc present in excess. The chromium-zinc compound thus produced is melted with an amount of copper or other metal proportional to the percentage of chromium desired. For example, to produce 100 kgs. of chromium-bronze 3.2 kgs. of chromium chlorid may be alloyed with 40 kgs. of zinc. The chromium-zinc compound thus obtained is added to 57 kgs. of copper. For a manganese-bronze 2.5 kgs. of manganese chlorid ($MnCl_2$) may be melted with the zinc and this compound may be added to a proportionate amount of copper. The particular proportions may, however, be varied within wide limits according to the desired percentage of the chromium or manganese desired in the final alloy. Thus to produce four per cent. of chromium or manganese in the bronze the chromium chlorid would be increased to 10 kgs. and the manganese chlorid to 12.8 kgs. These amounts it will be understood are for producing 100 kgs. of the final zinc-copper alloy.

Under this process chlorids may be added up to five per cent. of the metal containing the chlorid without requiring heating above the melting point of the copper.

An alloy produced by this process and containing one per cent. of chromium or manganese, fifty eight parts of copper and forty parts of zinc has a strength of fifty eight kilos. with a limit of elasticity of twenty nine kilos. and extensibility of from 18 to 20 per cent. An addition of about two per cent. of aluminum will greatly accelerate the reduction of the chlorids. In thus compounding the zinc with the chlorids of the manganese, chromium, or other metal, chlorid of zinc is produced and this is of special advantage.

In casting all alloys containing a certain quantity of zinc, oxid of zinc is produced and this forms accumulations and frequently produces loose, spongy places in the walls of the casting. The chlorid of zinc that is produced in my process dissolves this oxid of zinc, so that much better castings are obtained.

As chlorids of chromium, manganese and tungsten are very inexpensive compared with the pure metals, the alloys containing those metals can be produced by my process at much less expense than has heretofore been possible. The alloys of chromium and manganese are especially important. They present great strength at ordinary temperatures, and do not lose their strength when heated to a high temperature. The chromium alloys also exhibit great resistance to chemical agents, because the chromium is reduced from a chlorid and is alloyed *in statu nascendi* with the zinc; it is hardly attacked by such agents as sulfuric, nitric and hydrochloric acids. Copper-zinc alloys containing chromium and manganese when produced by present methods do not have this power of resistance to the action of chemicals, because the chromium or manganese reduced in accordance with the Goldschmidt process or with carbon do not possess any neutrality to acids.

What I claim is as follows:

1. The process of producing alloys which consists in first forming a compound of zinc and a chlorid of a metal having a less affinity

for chlorin than zinc has at the fusing temperature of such chlorid, and then melting said zinc chlorid compound with another metal.

2. The process of producing bronze which consists in first forming a compound of zinc and a chlorid of a metal having a less affinity for chlorin than zinc has at the fusing temperature of such chlorid, and then melting the said zinc-metal chlorid with copper.

3. The process of producing chromium-bronze which consists in first forming a compound of zinc and chlorid of chromium and then melting such chromium-zinc compound with copper.

4. The compound for the production of alloys composed of zinc and a chlorid of a metal having a less affinity for chlorin than zinc has at the fusing temperature of such chlorid melted together in substantially the porportions specified.

5. The compound for the production of alloys composed of zinc and chlorid of chromium melted together in substantially the proportions specified.

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Witnesses:
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