UNITED STATES PATENT OFFICE.

HANS GOLDSCHMIDT, OF ESSEN-ON-THE-RUHR, GERMANY.

METHOD OF PRODUCING METALS AND ALLOYS.

SPECIFICATION forming part of Letters Patent No. 578,868, dated March 16, 1897.

Application filed December 14, 1896. Serial No. 615,700. (No specimens.)

To all whom it may concern:

Be it known that I, HANS GOLDSCHMIDT, a subject of the King of Prussia, German Emperor, and a resident of Essen-on-the-Ruhr, Province of the Rhine, Germany, have invented an Improved Method for the Production of Metals and Alloys, of which the following is an exact specification.

If metallic compounds containing oxygen, sulfur, or chlorin—for instance, oxids, sulfids, and chlorids—are heated with aluminium, the respective metal is separated. If the aluminium has, perhaps, been used in excess, then there results an alloy of aluminium and the respective other metal. If different metals are reduced at a time, there is obtained an alloy of these metals, and said method may further, if desired, be employed for the production of an alloy of a metal or metals with a metalloid or metalloids.

The aluminium should be employed in a finely-pulverized state if the result is to be a success, and when the mixture of the pulverized aluminium and the compound to be reduced is heated up to the point of fusion there occurs a very energetic reaction. In consequence of the vehemence of the latter a certain quantity of the material is thrown out of the crucible before the reduction is finished, and that quantity, as well as the fuel consumed for heating the same, is lost for the useful effect of the process.

The purpose of my invention is to overcome described deficiencies, and I attain that object by causing the reaction to set in, not throughout the whole mass at a time, but only at one point or place of the mass. In other words, I initiate the reaction at a certain point or place of the mass and then cause it to proceed from the respective portion of the mass to the other or main portion of the same. Said initiating of the reaction may be performed, for instance, by igniting the mixture of pulverized aluminium and one or the other of the compounds aforementioned (or, more precisely, a small portion of that mixture) by means of a blow-flame directed against that portion, or by means of a piece of sheet or band magnesium that is put into that portion and is then ignited. I prefer, however, to make use of a special igniting mass for initiating the reaction, and I employ for that purpose mixtures of aluminium with such combinations or compounds that generate a great heat on being reduced. Such combinations or compounds must therefore be easily reducible, and I name as examples oxid of lead and baric peroxid, but similar oxids and peroxids may be used as well.

The igniting mass may either be loosely strewn upon the material or mixture to be put in reaction and may be ignited by a magnesium band or by a match, or it may be formed into balls or similar bodies by means of pressure or by aid of a suitable cementing medium, and a magnesium band may then be put into each of said balls or bodies. The latter are slightly pressed down upon and into the material or mixture to be put in reaction, and when ignited they transfer their own reaction easily upon said material or mixture. The reaction of the latter may be continued by adding fresh material to that contained in the crucible, and I prefer to press said fresh material into the shape of cubes, prisms, and the like.

The aluminium may well be replaced by a mixture or an alloy of aluminium and magnesium.

By making use of the improved method aforedescribed I am enabled to produce refractory metals, such as chromium, manganese, and the like in large quantities and on a commercial scale, and I can produce also alloys of such refractory metals as well as of a refractory metal with aluminium, and also of a refractory metal or metals with an alkali metal or metals, an earth alkali metal or metals, a rare earth or earths, and so on.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

The method of producing metals and alloys from metallic compounds containing oxygen, sulfur, or chlorin, consisting in finely pulverizing the compound, mixing it with finely-pulverized metallic aluminium, heating a small portion of that mixture to initiate the reac-

tion of said portion, without bringing the said portion out of contact with the remaining main portion, and letting the reaction then transfer itself to said remaining main portion, causing a continuation of the process by the heat developed by said initial reaction, as set forth.

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

HANS GOLDSCHMIDT.

Witnesses:
WM. ESSEMOEIN,
ERNEST ANDRÉ.