(No Model.)

G. SELVE.

METHOD OF MANUFACTURING METAL ALLOYS.

No. 296,884. Patented Apr. 15, 1884.

Fig: 1.

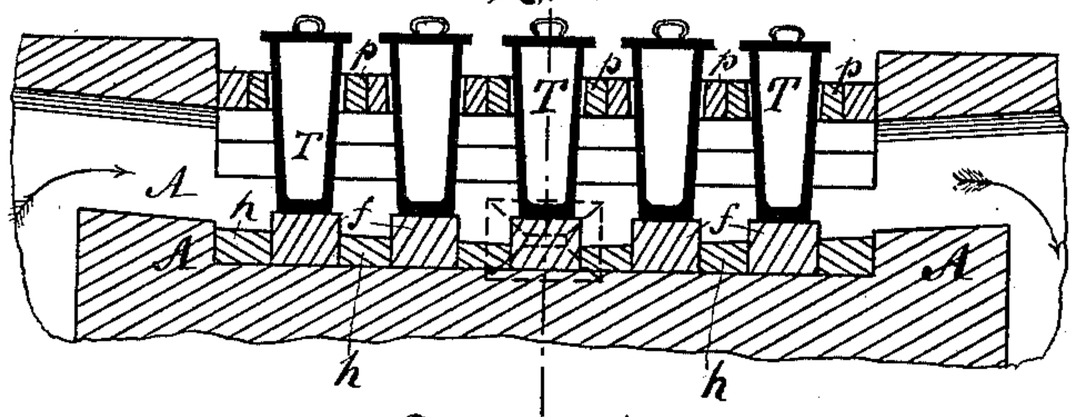


Fig: 2

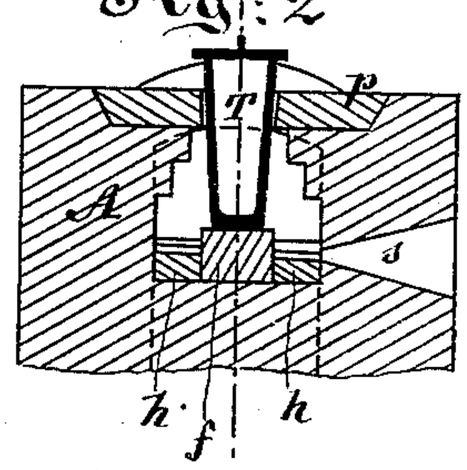


Fig: 3.

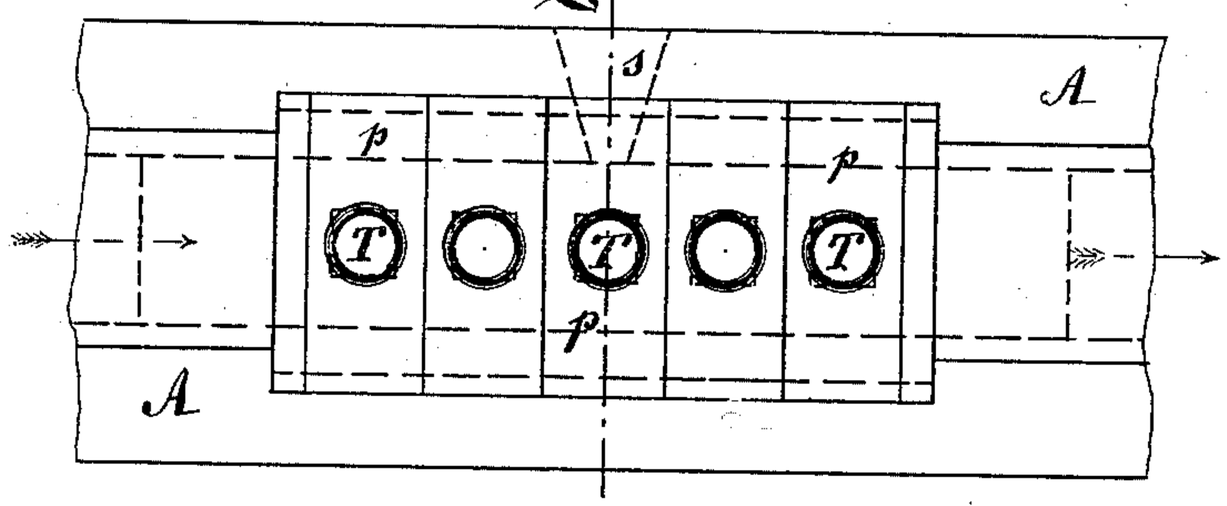


Fig: 4.

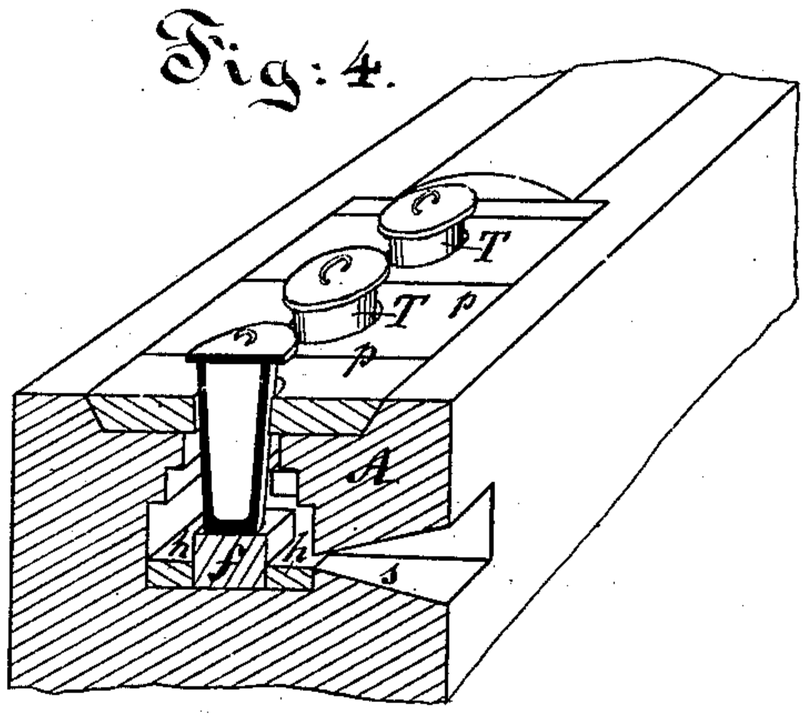
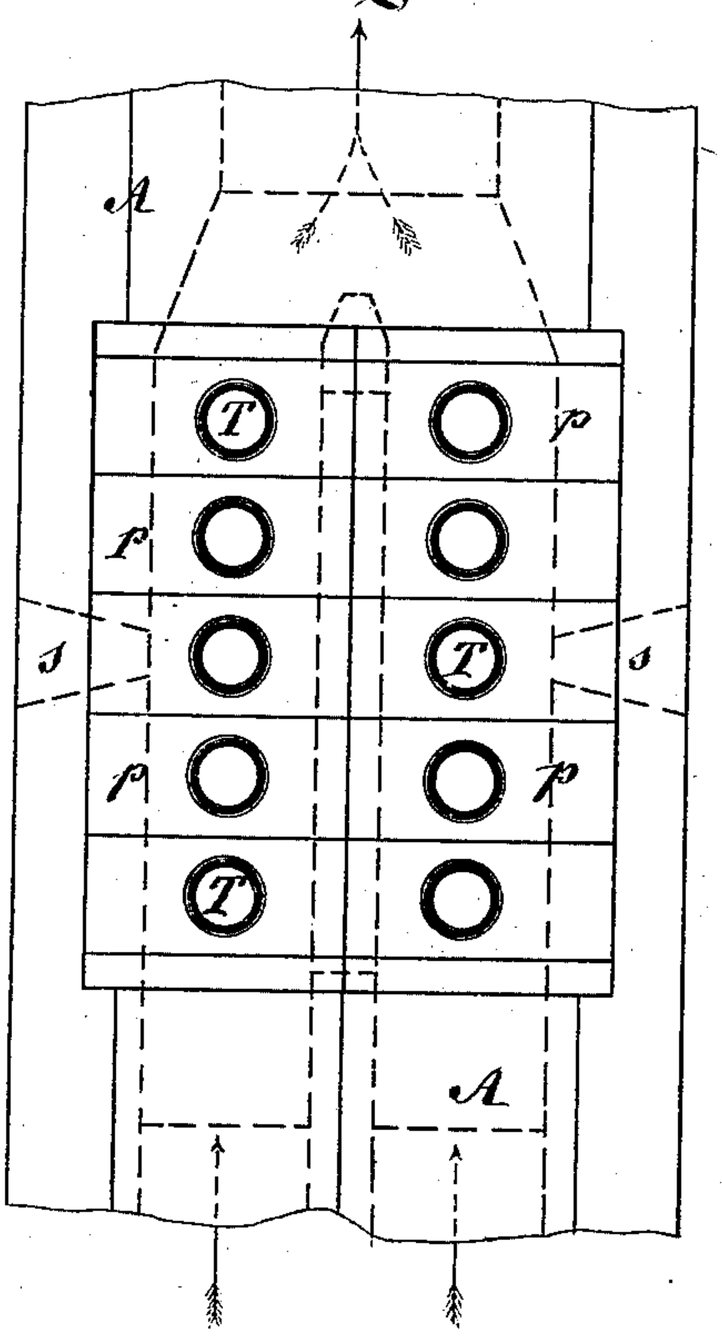


Fig: 5.



Witnesses
C. Gronert
L. Melcher

Inventor
Gust. Selve

UNITED STATES PATENT OFFICE.

GUSTAV SELVE, OF ALTENA, WESTPHALIA, PRUSSIA, GERMANY.

METHOD OF MANUFACTURING METAL ALLOYS.

SPECIFICATION forming part of Letters Patent No. 296,884, dated April 15, 1884.

Application filed June 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV SELVE, of Altena, Westphalia, Prussia, Germany, have invented certain new and useful Improvements in the Method of Manufacturing Metal Alloys, and in Apparatus for the Same, of which the following is a specification.

The present invention has more particularly for its object, first, to effect the smelting of the superior metals, in particular copper and zinc, to form alloys—such as brass and tombac—by preference in regenerative gas-furnaces; but other furnaces may be used in such a manner that, notwithstanding the high temperatures required for smelting the metals and at which the zinc volatilizes, there shall be only slight losses of the zinc; second, to avoid the various disadvantages attendant on the working of furnaces where the smelting is effected in crucibles with direct application of fire heat. The ordinary practice involves, in addition to the loss of zinc, the continued exposure of the workmen to a high degree of heat and to the injurious fumes of zinc. According to my invention the smelting is effected in crucibles in which, in consequence of the mode in which they are constructed and the manner in which they are set in the furnace, there exists at bottom a much higher temperature than at top. In order to obtain this difference of temperature, the crucibles are made somewhat longer and of smaller diameter, and only the lower part thereof is situated inside the furnace, the upper part being made to project through the arch or roof of the furnace. For smelting, for example, copper and zinc in such crucibles to form brass, the copper is first placed in the crucible and is melted at a temperature of from 1,050° to 1,200° centigrade, and the zinc is then quickly added in the requisite proportions—such as from one-third to one-half the quantity of copper—and brass waste is added to render the whole pasty, while at the same time cooler layers of metal are by this means formed in the upper part of the crucible. Thus the upper layers of metal are of a much lower temperature than below, and they are maintained at this low temperature by the successive further addition of cold brass waste, thereby causing the condensation of the greater part of the zinc vapors as they rise up into the cooled layers from the lower highly-heated layers of metal. By this means only small losses of zinc can take place, and these mainly at the first introduction of the zinc into the molten copper. On the average, only about from one-third to one-fourth the loss of zinc which takes place in the ordinary smelting process of zinc is experienced by this method. After the whole of the metal is melted the crucible is removed and the contents stirred, so as to obtain a homogeneous alloy. Should, during the stirring or at any period, further zinc vapors be formed, the upper liquid layers of metal, which are still at a lower temperature than the lower ones, (about 900° centigrade at top and 1,200° below,) are cooled with water, thus causing the condensation of such vapors.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a vertical longitudinal section, Fig. 2 is a vertical transverse section, Fig. 3 is a plan view, and Fig. 4 a perspective view, of a portion of a furnace equipped for working. Fig. 5 is a plan view of a modification, in which there are two rows or sets of crucibles and corresponding holes in the furnace to receive them.

Referring to Figs. 1, 2, 3, and 4, A is the furnace arranged according to this invention, with five crucibles, T. The long crucibles, somewhat smaller in diameter than usual, are introduced through openings in the roof of the furnace onto refractory blocks *f*, so as to project with their upper ends out of the furnace. The roof of the furnace is formed of refractory slabs *p*, having openings corresponding to the diameters of the crucibles. Between the sides of the crucibles and the opening a small space is left, (about 0.2 inch,) in order to prevent the two from melting together. The bed *h* of the furnace inclines slightly from all sides to the middle, so that should a crucible break during the smelting, the metal can at once be removed through the tapping-hole *s*.

The furnace may be constructed to take a greater or less number than five crucibles, according to requirements, and these may be arranged in two or more rows.

Fig. 5 shows a furnace arranged to receive ten crucibles.

The advantages of this method of smelting and mode of setting the crucibles are, mainly, as follows: First, the loss of zinc is reduced to a minimum, as it is almost entirely taken up by the alloy; second, a high degree of efficiency and regularity of working is obtained; third, a considerable saving of fuel is effected, as the furnace is closed during the smelting process, with the exception of the small interstices between the crucibles and the openings, the latter being closed quickly and easily by covers when the crucibles are removed; fourth, the labor is easier and less injurious, as the workman is hardly at all subjected to the zinc fumes and the heat is much less felt; fifth, the castings remain clear, because the alloy cannot be deteriorated during the smelting by particles of fuel, such as frequently fall into the crucibles with ordinary furnaces; sixth, there is a less destruction of crucibles, as these sustain double the number of charges as compared with the ordinary process of smelting.

I claim as my invention—

1. The method of smelting alloys, more particularly those of zinc, in closed crucibles that are situated with their lower parts in the furnace, while their upper parts project out of the same, consisting in supplying the crucible with copper and melting it, then quickly adding zinc in proper proportions and brass waste, then closing the crucible and applying heat to the lower part thereof, while the upper part is externally exposed to the air, whereby the zinc vapors generated in the lower hotter layer of metal become condensed in rising up into the upper cooler layers, as herein specified.

2. In smelting zinc alloys, the method herein described, consisting in supplying the crucible with copper and melting it, then adding zinc in proper proportions and brass waste, then closing the crucible and applying heat to the lower portion of the same, and thus effecting the condensation of the zinc vapors generated in the lower part of the crucible by means of the cooler upper layers of metal therein, substantially as herein specified.

In testimony whereof I have hereunto set my hand at Berlin, this 29th day of May, 1883, in the presence of two subscribing witnesses.

GUST. SELVE.

Witnesses:
C. GRONERT,
B. ROI.