(No Model.)

J. SACHS & E. HUBER.

PROCESS OF MANUFACTURING METALLIC POWDER.

No. 521,991. Patented June 26, 1894.

Fig. 1.

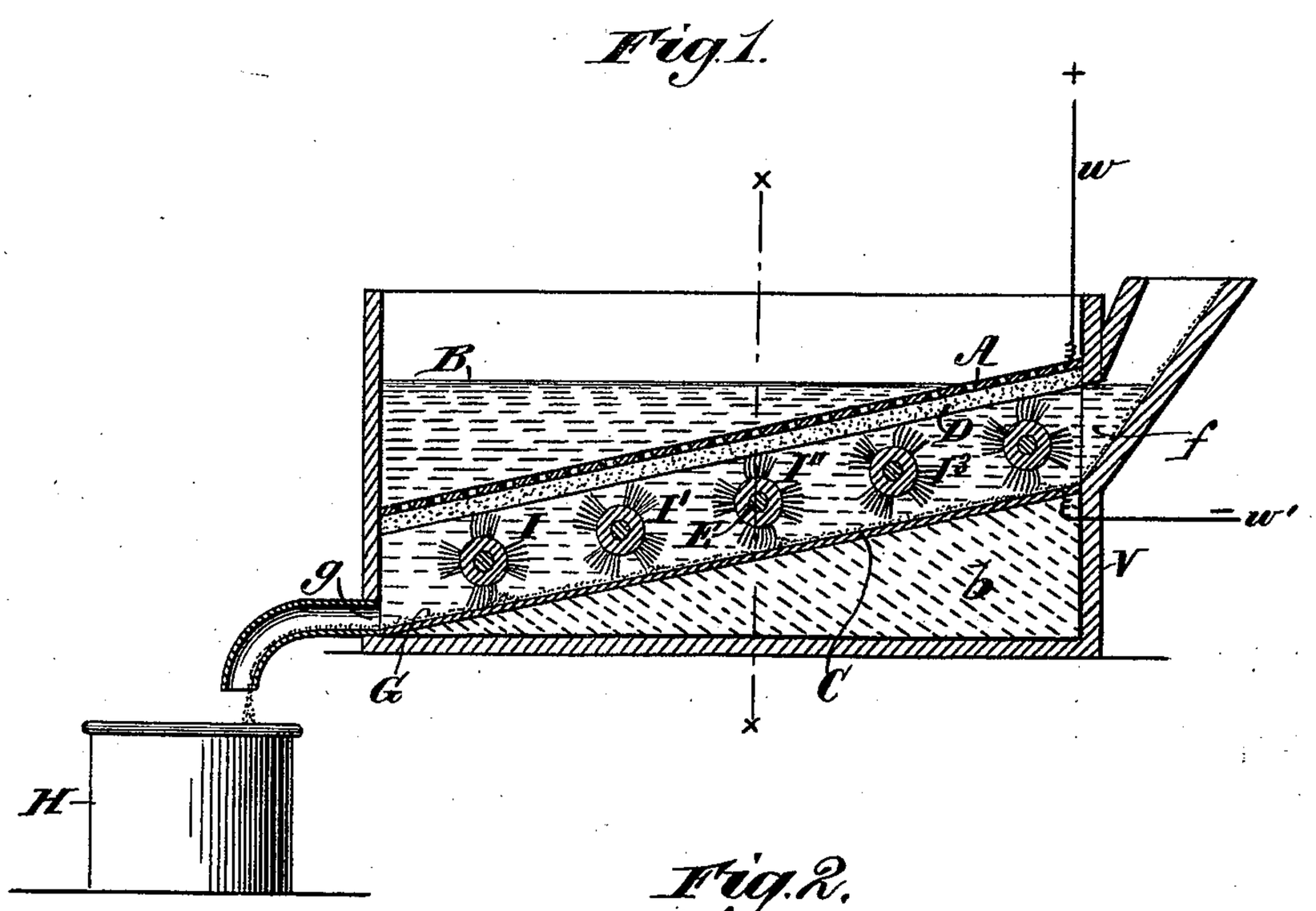
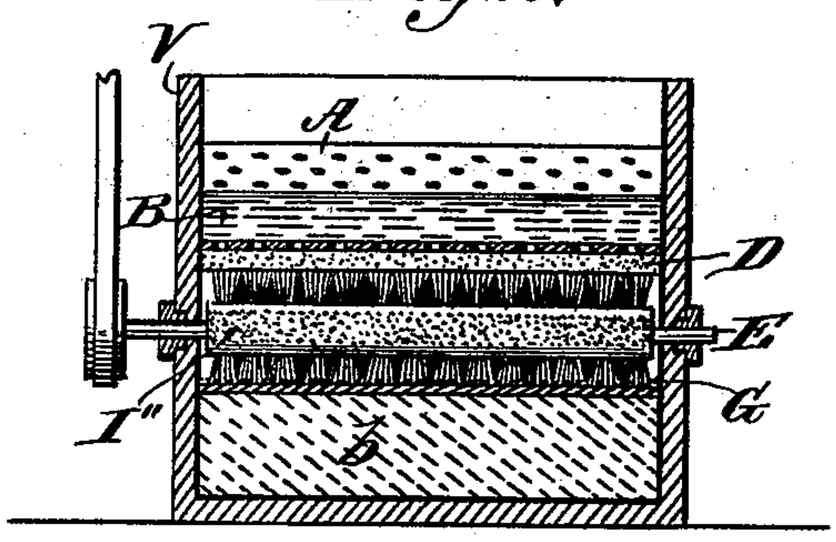


Fig. 2.



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PROCESS OF MANUFACTURING METALLIC POWDERS.

SPECIFICATION forming part of Letters Patent No. 521,991, dated June 26, 1894.

Application filed February 12, 1894. Serial No. 499,927. (No specimens.)

To all whom it may concern:

Be it known that we, JOSEPH SACHS, a subject of the Grand Duke of Baden, and ERNEST HUBER, a citizen of Switzerland, both residing in the city and county of New York and State of New York, have invented certain new and useful Improvements in Processes of Manufacturing Metallic Powders; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to the process of manufacturing metallic powders and its novelty consists in the several successive steps of the process by which the desired result is obtained.

The object of our invention is to produce a powder, each grain of which shall be capable of use in relations where pure bronze or other metallic powders may be employed and which shall at the same time be cheaper. In the course of our experiments, we have discovered a process which seems to attain this object and which we believe to be new and highly useful. Our discovery consists in brief, of the fact that by interposing between certain well known electrodes, during the process of electrolysis, a metallic conductor in a finely divided state and which is kept in constant agitation so that its particles are forced upon the cathode and kept from contact with the anode these particles become covered with a shell composed of the metallic base of a salt fed between the electrodes. The amount of the deposit and its precise nature are dependent upon the nature of the electrodes and of the bath employed, the strength of the current, the rapidity of motion of the metallic conductor and the time of its exposure.

The mechanical apparatus which in the light of our present knowledge we think best adapted to carry out our invention we will now describe.

In the drawings, Figure 1 is a vertical central longitudinal section and partial plan view of one form of the apparatus used by us, and Fig. 2 is a transverse section thereof on the plane of the line *x*—*x* in Fig. 1.

In the drawings, V is a box or receptacle made of any suitable material and provided with an inlet aperture *f* and an outlet aperture *g*. The cathode C made for instance of a sheet of brass in the form of a flat plate, is secured in the box in an inclined position from the inlet to the outlet aperture and rests upon a solid base *b* of any suitable material, for instance, cement. The anode A made of a suitable material is also secured within the box V in a position, for instance, substantially parallel with that of the cathode C and it is separated from the anode by a dialytic partition D for instance, a plate of baked clay. It is necessary that the anode should be perforated or made otherwise permeable. Electric wires *w*, *w'* are connected with the anode and cathode in the usual manner and supply a current from a source of electricity not shown. Mounted on shafts E journaled in the side of the box V in any suitable manner, and located between the anode and cathode, is a series of brushes I I' I'', &c., adapted to revolve, across the surface of the cathode and actuated by any suitable means quite within the range of an ordinary mechanical skill to provide, for instance, a belt and pulley. The brushes should be so arranged that their extremities just touch the upper surface of the cathode.

The action of the apparatus is as follows: Surrounding the anode is a bath B consisting of a cyanide solution, containing copper and zinc salts. There is then caused to be fed at the inlet aperture *f*, by any suitable means, a cyanide solution of copper and zinc salts in which is powdered zinc G, or other similar metallic conductor in a finely divided state, and which has been previously well cleansed. The brushes I I' I'', &c., are then set in rapid motion. The particles of powdered zinc are caught by the bristles and forced over the cathode. They are thus prevented from adhering to the cathode or to each other. It will be found that in a short time each particle of the powdered zinc has been completely covered with a shell of brass deposited thereon. The covered particles gradually drop downward by the action of gravity and the freedom of motion caused by the agitation of the solution by the brushes, until they reach the outlet aperture and are received in

a suitable vessel, as H. The length of the cathode and strength of the current should be so arranged that each particle of the zinc will be completely covered by the time this outlet aperture is reached. This data should in each case be predetermined by experiment.

The product obtained by means of the process described when removed from the bath and dried is, so far as its external appearance goes, pure brass, and, if a powder of this kind is desired, it is ready for use after polishing. If, however, other shades of color are desired or surfaces of other metal are to be used, such product may be treated as follows: It may be treated electrically or by simple immersion and its particles receive a direct deposit of other metals or alloys, for instance, nickel, silver, gold, iron, copper, brass, lead, &c., and various shades of color and different metallic lusters may be produced by treating the metals so deposited in ways well known in the art, for instance, by using solutions composed of salts of different metals, by changing the anodes, or by treating the coated particles with different or varying degrees of heat. In short this product may be treated as though its particles were pure brass. During any such subsequent processes, however, the grains must be kept from adhering to each other by continual agitation.

Other metallic bases for the powders, may be employed, instead of zinc, for instance, iron, copper or other alloys or metals may be deposited thereon, but the principle upon which the formation of the product depends will be the same in each instance.

By the word "powders" we do not mean to confine ourselves to a material composed of particles in an impalpable form. We include within the term what are technically known as "flitters" and "metallics," the former consisting of flaky particles and the latter of particles larger than those to which the term powder is commonly applied and usually having well defined edges and surfaces.

Having described our invention, what we claim as new is—

1. The process of manufacturing metallic powders which consists in interposing between suitable electrodes during the process of electrolysis a metallic conductor in a finely divided state maintained in motion during said process.

2. The process of manufacturing metallic powders which consists in depositing a shell of metal by electrolysis upon each particle of a metallic conductor while the latter is in a finely divided state and under conditions of constant agitation.

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

JOSEPH SACHS.
ERNEST HUBER.

Witnesses:
WM. RAIMOND BAIRD,
MAY G. RIDLEY.