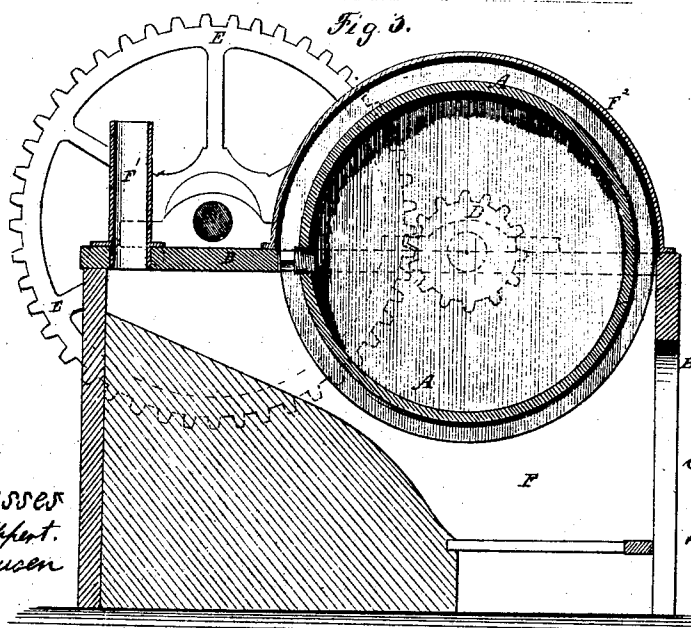
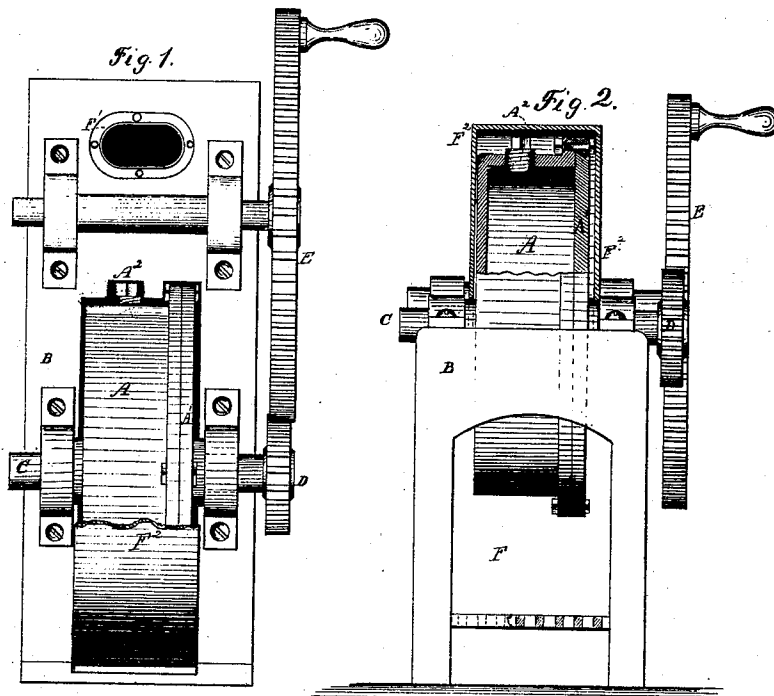


*C. S. Eyster,*  
*Metallic Separator.*  
*No. 104,130.      Patented June 14, 1870.*



*Witnesses*  
*A. Ruppert.*  
*C. H. Clausen*

*C. S. Eyster*  
*Inventor*  
*D. R. Holloway & Co.*  
*Attys*

# UNITED STATES PATENT OFFICE.

CHRISTIAN S. EYSTER, OF DENVER, COLORADO TERRITORY.

## IMPROVEMENT IN SEPARATING AND REFINING METALS.

Specification forming part of Letters Patent No. **104,130**, dated June 14, 1870.

*To all whom it may concern:*

Be it known that I, CHRISTIAN S. EYSTER, of Denver, in the county of Arapahoe and Territory of Colorado, have invented a new and Improved Process and Apparatus for Concentrating, Separating, and Refining Metals of Different Specific Gravities, when mingled and in a state of fusion or fluidity, and of holding or keeping them in that state of concentration, separation, and refinement until they become solidified, when they may be, by ordinary mechanical means, cut out from each other, according to their respective values; and I hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, making part of this specification.

Figure 1 is a plan view. Fig. 2 is an end elevation. Fig. 3 is a vertical longitudinal section.

Similar letters have reference to the same parts.

This invention is designed and intended to effect a concentration, separation, and refinement of metals having different specific gravities, when mixed or alloyed and brought into a state of fusion; and my improved process consists in subjecting the fluid-metal mixture or alloy to rapid rotation in a close receiver, turning on its axis, until the different metals of various specific gravities are mechanically concentrated, separated, and refined by the action of the centrifugal force, which will cause the particles or atoms of greatest specific gravity to range themselves on or near the periphery, and those of less specific gravity to arrange themselves in rims or bands concentrically, in the order approximately of their respective specific gravities.

When the metals have thus been concentrated, separated, and refined, they may be gradually cooled by abstracting or taking from the furnace the applied heat necessary for their fused condition while still rotating, until, when solidified, the block may be removed and the metals separated or cut from each other, according to their respective values, by the chisel, tool, or lathe, or in any other analogous manner; and these metals, thus approximately concentrated, separated, and re-

fined, may again be subjected to the same treatment with others before thus treated, and of a like or similar value, until a more perfect, complete, and valuable concentration, separation, and refinement are effected.

The nature of the apparatus will clearly appear from the following description.

It is a metallic chamber, of suitable size and figure, preferably cylindrical or spherical, formed of two parts, so arranged that one of the heads A may be detached for the removal of the ingot when the operation has been completed, to facilitate which the interior of the chamber should have a sufficient draft to conveniently disengage the ingot.

An opening, closed by a plug, A<sup>2</sup>, or in other convenient manner, is left in the periphery, to be used for filling the chamber with the melted metals. The chamber A is suspended upon axles C, attached to each head in suitable bearings on the frame B. The caps of these boxes should be so constructed that they may be conveniently removed to permit the cylinder and its axles to be removed. The interior of the cylinder should be smoothed or polished to diminish the adhesion of the ingot.

The chamber is caused to revolve by the pinion D, driven by the spur-wheel E, operated by such driving mechanism as will impart a rapid motion to the chamber in either direction at the will of the operator.

Under the cylinder is a furnace, F, in which a fire may be maintained to keep the cylinder at a temperature as high as that of the fused metals, or higher, if need be, and to keep the metals in fusion.

F<sup>1</sup> is the uptake.

A casing of sheet or other metal, F<sup>2</sup>, surrounds the cylinder or chamber A, so as to allow a free circulation of heat entirely around the exterior of the chamber A.

The mode of operating the apparatus is as follows: The cylinder or chamber A being heated to such a temperature as will continue the molten metals in a state of fluidity, the plug A<sup>2</sup> being removed, the mixed or alloyed metals, being reduced to a molten or a fluid state by heat in any suitable and convenient furnace, are poured into the chamber, and the plug A<sup>2</sup> inserted and fastened; or, in some cases, the metals may be put into the cylinder A in a solid form, and then melted. The chamber A

is then to be caused to revolve at a high velocity, sufficient to accomplish the intended purpose long enough to permit and force the metals to be separated by the centrifugal force and action, according to their different and respective specific gravities, and arranged in approximate concentric bands within the chamber. The fire should then be removed from the furnace, and the metals within the revolving chamber permitted gradually to cool, the rotation of the cylinder still being kept up until the ingot within is solid enough to be removed, when the cylinder is to be lifted from the frame, the head A removed, and the ingot taken out. It may then be placed in or under a lathe and the metals turned or cut out, according to their respective purity and value, and assorted to be further purified or separated, concentrated, and refined by this same process with others of like or similar kind and value, or by such other ordinary modes as may be in use.

I prefer to arrange the chamber or cylinder to revolve in a vertical plane; but it is obvious that it may be made to produce the same result when revolving in a horizontal plane.

I do not restrict my claim to any particular

form or arrangement of the several parts, for these may be varied greatly without departing from the principle of my invention.

The separation of silver from lead may be aided by the addition of a small quantity of zinc.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The mode of separating molten alloys of metals of different specific gravities, by causing them to revolve in a heated revolving chamber, to form, on gradual cooling, an ingot in which the metals are arranged in bands of more or less purity, according to their different densities, substantially as set forth.

2. The chamber A, with a removable head, suspended upon axles C, attached to the heads and arranged to revolve within a furnace, substantially as and for the purpose set forth.

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

CHRISTIAN S. EYSTER.

Witnesses:

JAMES S. GRINNELL,  
S. M. POOL.