(No Model.) 4 Sheets—Sheet 1.

J. A. MAYS.

APPARATUS FOR SEPARATING METALS.

No. 566,921. Patented Sept. 1, 1896.

Fig. 1.

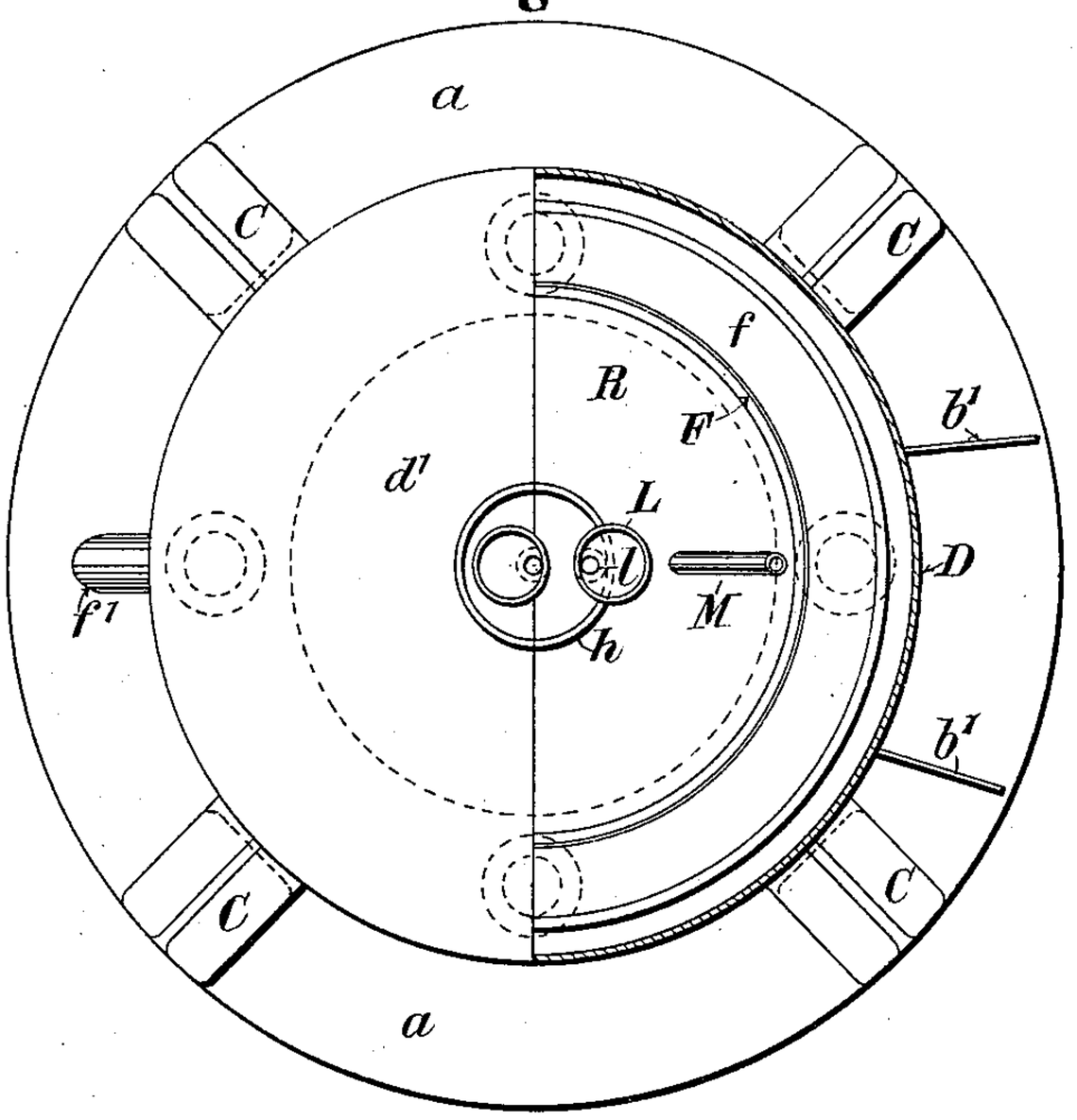
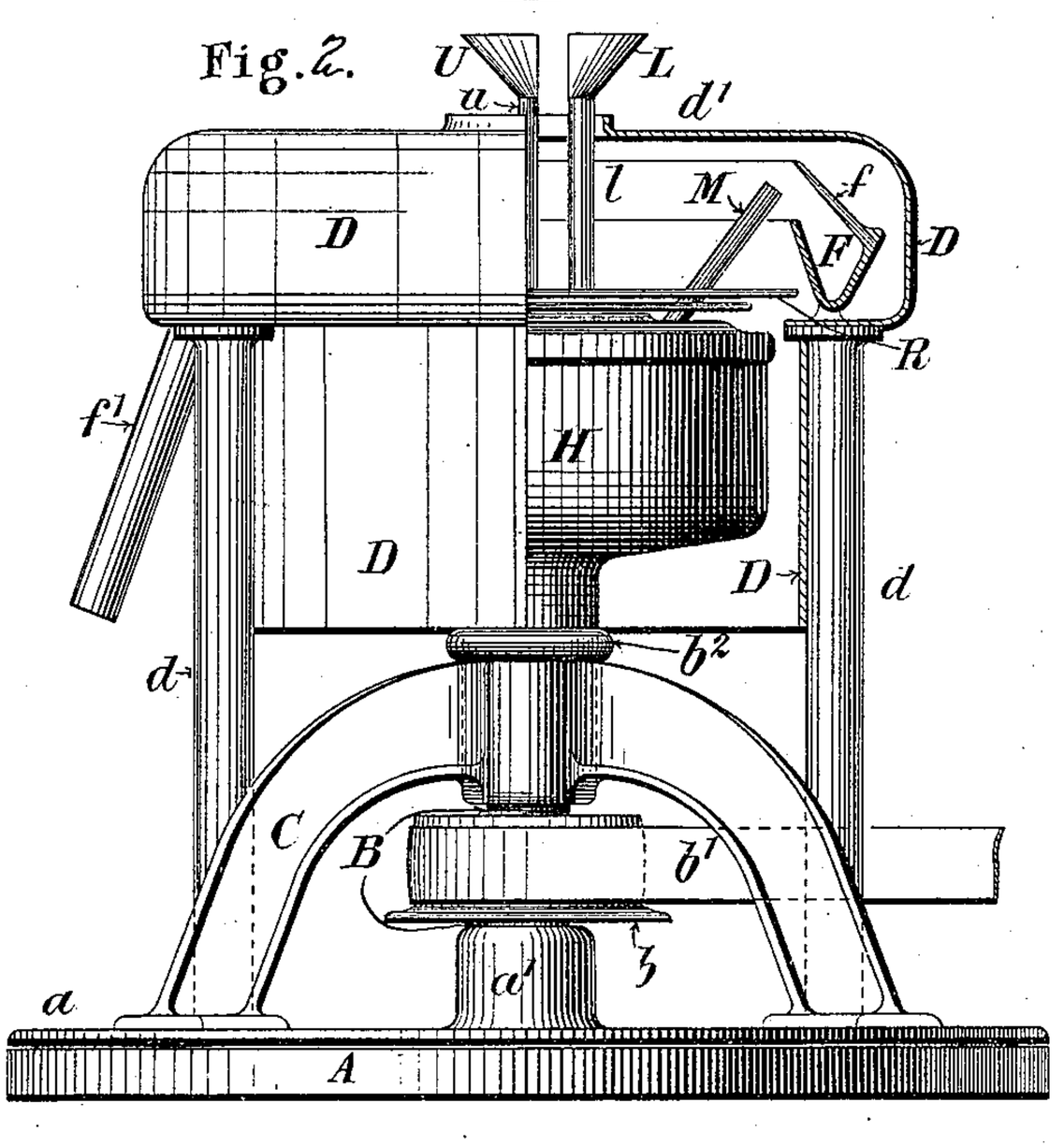


Fig. 2.



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APPARATUS FOR SEPARATING METALS.

No. 566,921. Patented Sept. 1, 1896.

Fig. 3.

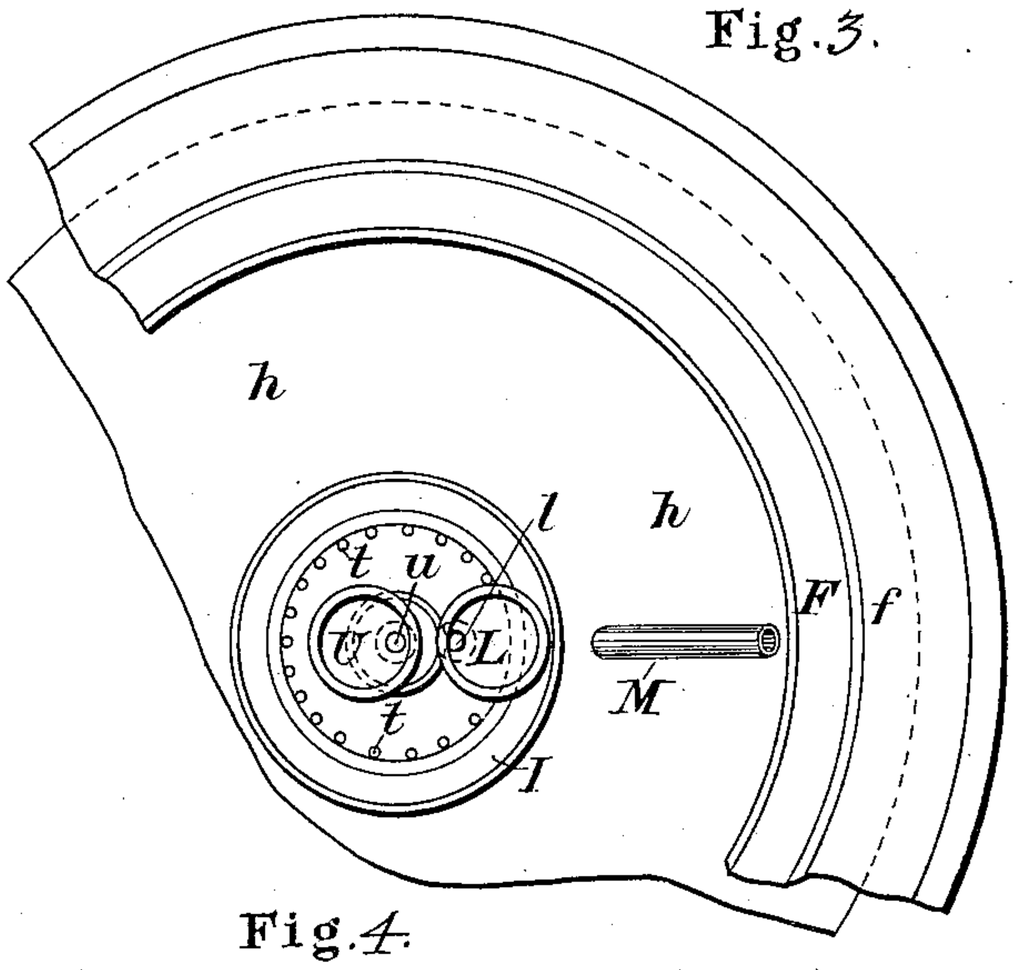
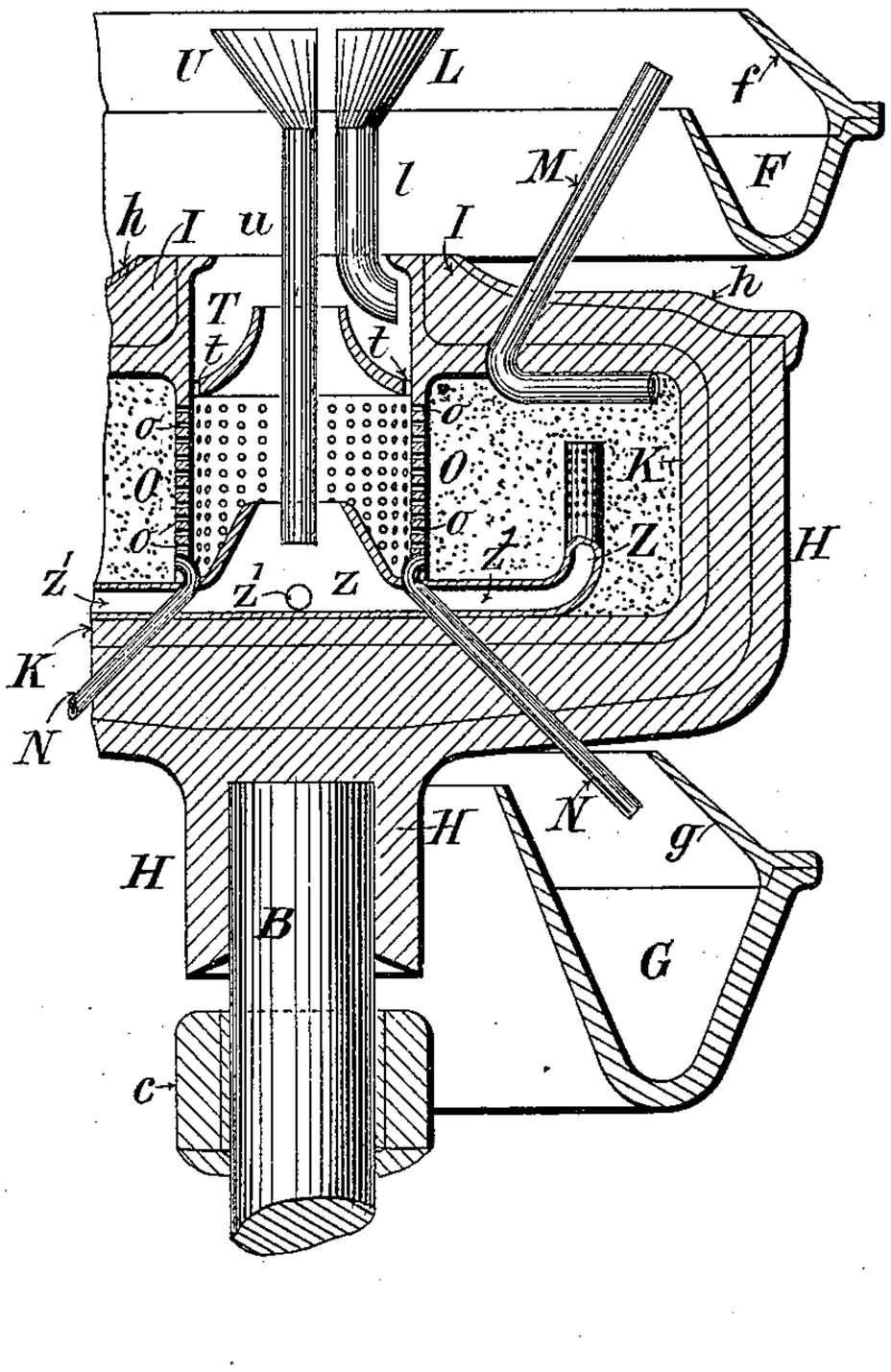


Fig. 4.



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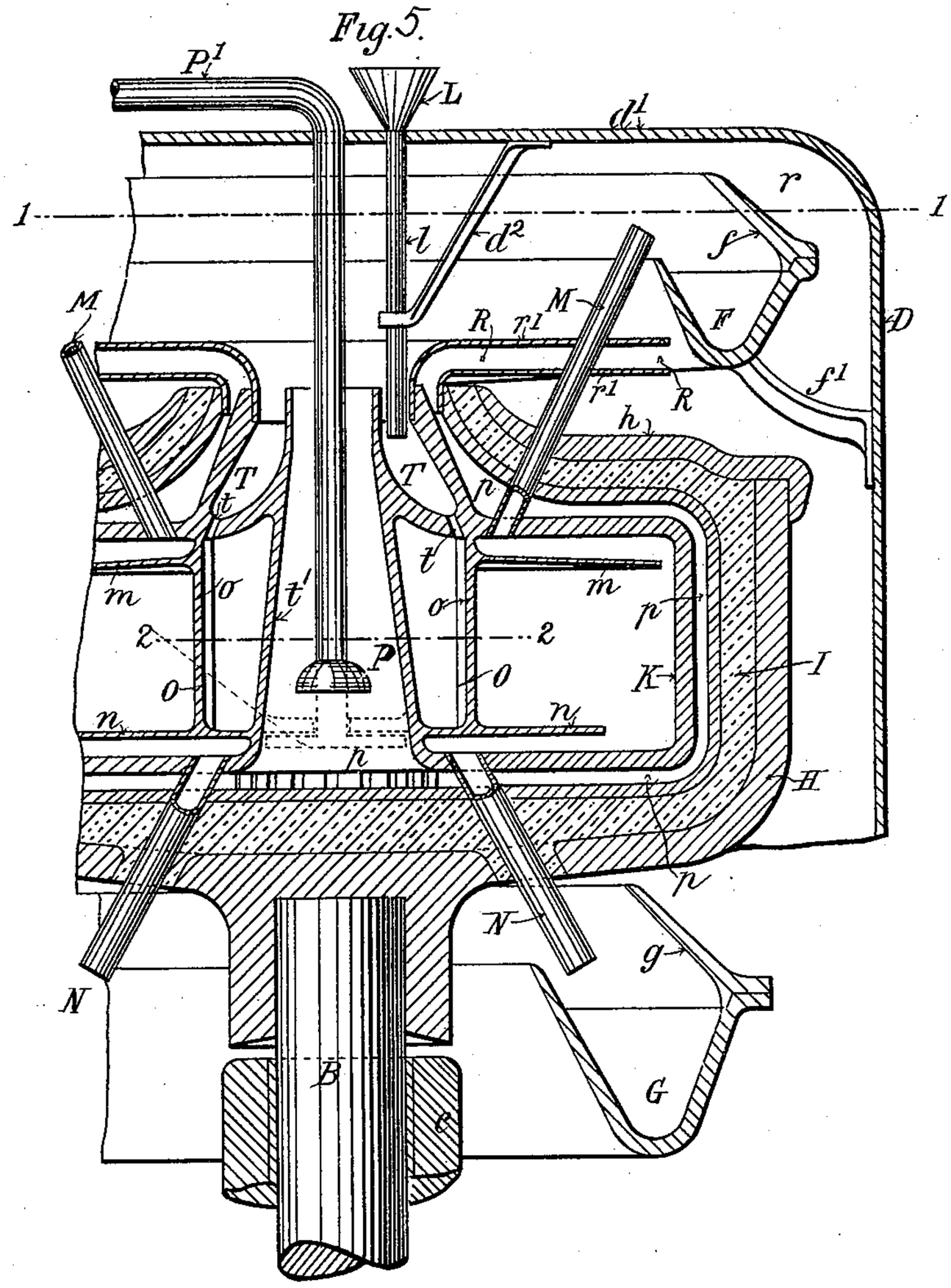
APPARATUS FOR SEPARATING METALS.

No. 566,921. Patented Sept. 1, 1896.

Fig. 5.



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APPARATUS FOR SEPARATING METALS.

No. 566,921. Patented Sept. 1, 1896.

Fig. 6.

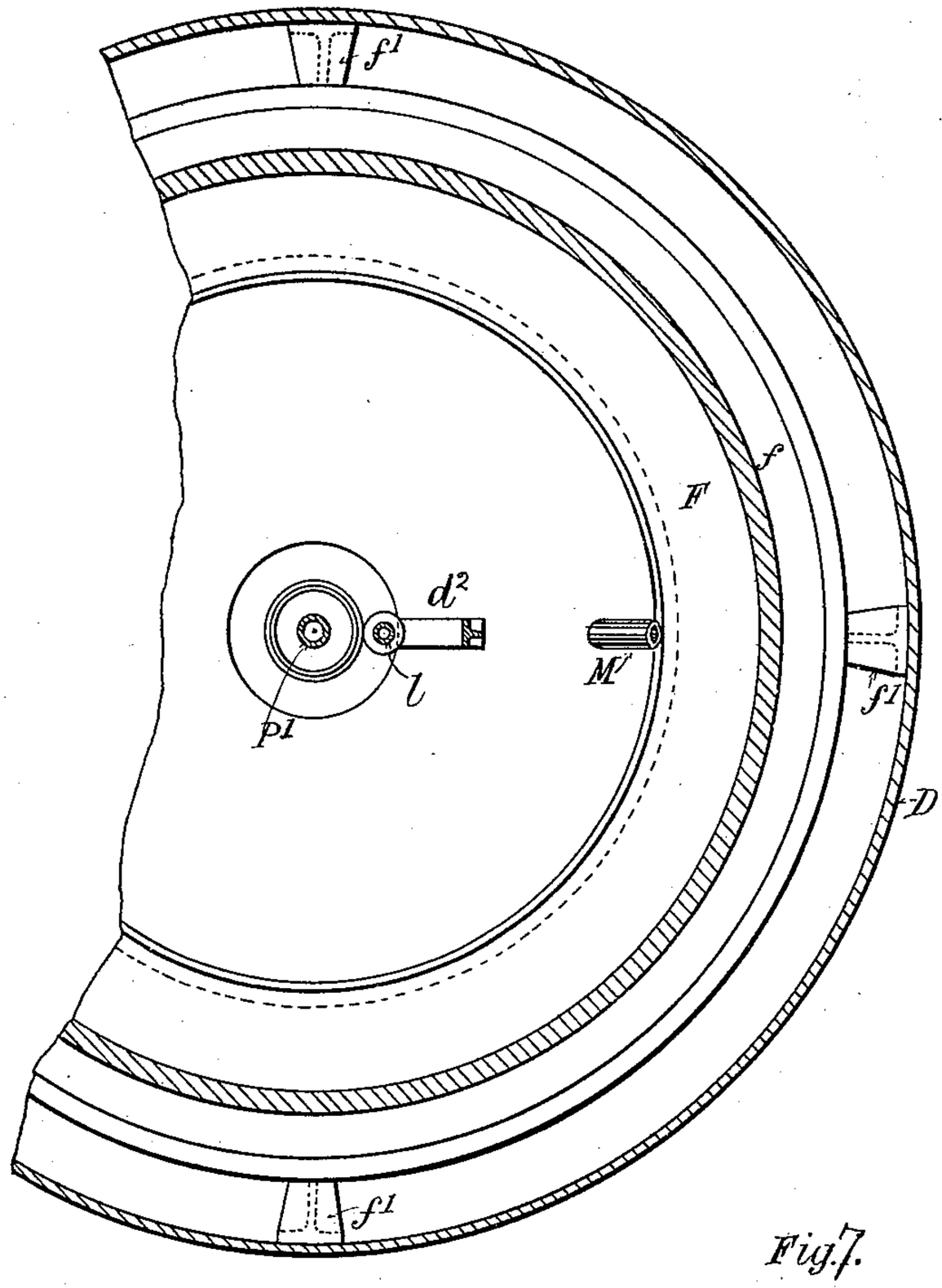
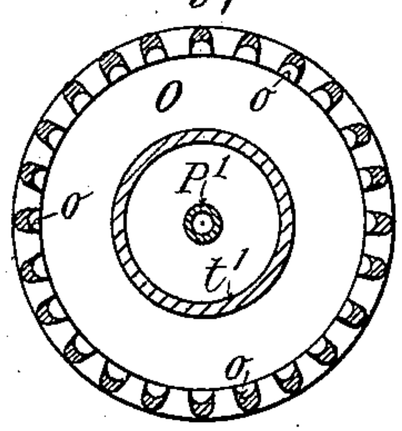


Fig. 7.



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UNITED STATES PATENT OFFICE.

JONATHAN A. MAYS, OF LONDON, ENGLAND.

APPARATUS FOR SEPARATING METALS.

SPECIFICATION forming part of Letters Patent No. 566,921, dated September 1, 1896.

Application filed March 26, 1894. Serial No. 505,361. (No model.) Patented in England May 4, 1893, No. 8,964, and in Germany April 3, 1894, No. 78,706.

To all whom it may concern:

Be it known that I, JONATHAN ALDOUS MAYS, a subject of the Queen of Great Britain, residing at 1 Belsize Terrace, Hampstead, London, England, have invented certain new and useful Apparatus for Separating Metals from and Purifying Lead, of which the following is a specification.

This invention was patented in Germany April 3, 1894, No. 78,706, and in Great Britain May 4, 1893, No. 8,964.

My invention relates to separating metals from metals and purifying molten metals by removing or eliminating other substances or materials therefrom. For these purposes advantage is taken of the superior solvent property or chemical affinity of some molten metals for others by using one such molten metal as a menstruum or bath through which the mixed metals forming the subject material is or are continuously passed and drawn off while in a molten state.

As my invention refers particularly to separating other metals from and purifying molten lead, I hereby disclaim any application of the same invention other than that of separating or extracting metals from molten lead by the use of a menstruum of molten zinc or alloy of zinc.

The foreign metals or impurities to be separated or extracted from argentiferous or ordinary lead, generally speaking, are silver, gold, copper, antimony, and arsenic, and I use the term "argentiferous" lead in this specification as including lead containing any or all of these metals.

For the purpose of removing any or all of these successfully according to my invention it is necessary that the molten metal forming the menstruum shall have a greater affinity for the impurities than the lead has. Zinc is peculiarly suitable for use as such a menstruum; but any alloy of zinc, such as zinc and copper or zinc and aluminium, which has this greater affinity for the impurity in lead and is also of a different specific gravity to lead, may be used.

In this specification wherever I use the term "equivalent metal" I use the same as meaning a metal having an equivalent property to zinc in respect to combining with metals which may be contained or carried by argentiferous lead, and which is also of a different specific gravity to lead.

In the accompanying drawings, in which like letters indicate similar parts or parts fulfilling the same functions, Figure 1 is a plan, and Fig. 2 is an elevation, of a centrifugal apparatus. Fig. 3 is a part horizontal section, and Fig. 4 is a vertical section, of same. Fig. 5 is a vertical section through the axis. Fig. 6 is a horizontal section on line 1 1, and Fig. 7 is a horizontal section on line 2 2, of a modified form of a centrifugal apparatus.

The standing parts are sectioned from top left to bottom right corners, while the revoluble parts are sectioned from top right to bottom left corners of the drawings.

Figs. 1 and 2 show outside views of part of the fixed casing and of the revoluble parts of a centrifugal apparatus for the purposes of my invention.

A is a base-plate between which and the plate *a* is interposed some resilient material for neutralizing the vibration of the rotating parts. A projection *a'* in the center of this latter plate *a* forms a foot-step bearing for the spindle B, upon and with which all the revoluble parts rotate.

C is a bow-shaped bracket, the center boss *c* of which forms the upper bearing for the spindle B, for which bearing b^2 is an oiling device.

b is a pulley, and *b'* a belt for rotating the spindle B. Rigidly attached to the upper end of this spindle B is a boss which forms part of the outer casing H of the rotating vessel, which outer casing being continued upward in the form of an annular wall meets and has fixed to it the cover *h*.

K is the interior receiver or vessel, in which is contained the molten zinc or other menstruum, and between this and the outer casing H is interposed a layer of non-conducting material for the purpose of preventing the heat of the receiver being communicated to the outside casing H.

O is a cylindrical chamber having a number of small perforations *o*, through which the argentiferous lead passes into the zinc menstruum. The argentiferous lead is sup-

plied through the funnel L and pipe *l* to the annular gallery T, whence it flows through the orifices *t* into the cylindrical chamber O, and thence through the menstruum. The passing of the lead through the menstruum removes the impurities hitherto contained in it, and finally the purified lead flows off continuously through the eduction-tube M into the lead-collector F, which is emptied by the pipe *f'*. *f* is a deflecting-plate. U is a funnel, and *u* a pipe, whereby molten zinc or its equivalent metal is supplied to the distributer *z* and by centrifugal force passes through the tubes *z'* to the perforated tube Z, whence it flows into the molten menstruum.

The addition of more zinc to a menstruum which may be supposed to reach already to the level determined by the outflow-tubes N causes some of the menstruum to escape through them, strike against the zinc-deflector *g* and fall into the fixed zinc-alloy collector G. Thus argentiferous lead is continuously flowing in and passing out in a purified state into one collector, while fresh zinc is slowly passing in and flowing out as zinc alloy into another collector.

Figs. 5, 6, and 7 show a machine with some slight modifications in detail where it is intended to discharge only the lead continuously through the eduction-tube M, the body of zinc forming the menstruum remaining in the vessel until it has become sufficiently enriched, when, the supply of argentiferous lead being discontinued and the rotation of the machine stopped, the whole charge passes under the diaphragm *n* and escapes through the eduction-pipes N. *m* is a diaphragm which is placed so as to secure the discharge of that portion of the purified lead which is situate near the extreme radius of the vessel K. It will be seen that the gallery T is somewhat differently shaped from that shown in Fig. 4, and that an annular tapering wall *t'* is introduced for the purpose of sealing the zinc forming the menstruum from the atmosphere. The argentiferous lead fills part of the gallery and passes through the orifices *t* into the channels *o* of the grill O and flows over the edges of these channels into the molten zinc forming the menstruum. The channels (shown in horizontal section in Fig. 7) serve the same purpose as the perforations *o* in Fig. 4 of securing the distribution of the molten argentiferous lead in minute particles, thin films, or filaments in the menstruum, thus securing intimate contact of the subject metal therewith. d^2 is a bracket for supporting the lead pipe *l*. In these figures is also shown a method of heating the receiver or vessel as well as the collector. *p'* is a pipe through which is supplied either gas, gas and air, or heated air. P is a burner of any suitable kind, either common or atmospheric. The heated products of combustion from this burner pass through the grooves or channels *p*, which form flues around the outside of the vessel K, and thereby maintain the required temperature of the menstruum. The products of combustion then pass on into a flue or chimney R, formed by two plates *r'*, which rotate with the vessel and are caused to impinge upon and heat the lead-collector F. They then pass through the flue *r* into the atmosphere. When air heated outside the apparatus is employed, the burner *p* is not used, but a supply of hot air is forced through the device shown in dotted lines into the flues *p* and this follows the same course as the products of combustion above referred to.

In practice I first charge the apparatus with a small quantity of lead and follow with the molten menstruum in sufficient quantity to reach the proper level or radius, as the case may be, and then feed in the argentiferous lead intended to be treated.

I claim—

1. In a centrifugal machine for separating silver and other metals from molten argentiferous lead, the combination of a revoluble vessel, a molten menstruum carried thereby, means for feeding the material to the vessel in such relation to the menstruum as to be forced therethrough by centrifugal force, and an eduction passage or passages through which the purified lead passes out, substantially as described.

2. In a centrifugal machine for separating metals from molten argentiferous lead, the combination of a revoluble vessel, a molten menstruum carried thereby, means for feeding the material to the vessel in such manner as to be forced through the menstruum by centrifugal force, a heating-chamber at the center of the vessel, and eduction-pipes leading from the vessel, substantially as described.

3. A centrifugal separator comprising an outer casing, a menstruum-chamber, a receiver or chamber for the lead, a passage between the casing and menstruum-chamber and a central hot-air chamber communicating with the passage between the casing and menstruum-chamber, substantially as described.

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