

in a direction perpendicular to the cap-cone, or they may be made tangential—*i.e.*, bored at a tangent to the internal circumference of the cone, thus securing a rotary initial flow of the inflowing liquors, instead of a series of straight ones. In the majority of cases, however, perpendicular bore-holes answer equally well.

The clear precipitated liquor may be drawn off at any point above the limit of subsidence, either by a pipe or, preferably, by allowing it to flow equally over the rim-circumference of the apparatus. The latter method secures the quieter and more uniform outflow, and does not disturb the top layers of liquor, undergoing final subsidence, by establishing a quick current in one particular direction.

If desired, the rim may be encircled with a filter-screen of lawn, calico, or other filtering or straining medium, so as to retain within the apparatus any particles of precipitant which may be floated or buoyed up by bubbles of air or other gas.

The clear liquors passing over the rim and through the precautionary filter or strainer fall into and are collected by a circular trough or launder attached to the apparatus below the rim, whence they are conveyed away by a pipe. As before stated, this may lead into a storage-vat or into another similar apparatus; or, if deposition of the floating particles is not absolutely complete, into any suitable known type of apparatus (such as, for example, the slat-partitioned tank, used for freeing softened water from traces of deposit) where subsidence is finally rendered absolute. In most cases where traces of precipitant have escaped I have secured perfect final subsidence by allowing the liquors to flow through a shallow plain tank of from four to six times the area of the top of the precipitating apparatus, before passing them direct to the storage liquor-vats. Such an apparatus as I have described I term a "precipitating cone." It may be constructed of any suitable material, such as wood, stoneware, galvanised iron, &c., according to the nature of the liquor or precipitant it is designed to treat. Its action, until the charge of precipitant it contains is exhausted and requires renewal, is perfectly automatic and continuous. Its capacity, its height, the angle of its sides, the ratio of inflow-diameter pipe to top area of cone, will naturally vary with the volume of liquor to be dealt with, the rate and head of liquor-inflow, the relation of the specific gravity of the liquor to that of the finely-divided precipitant, the actual coarseness or fineness of the particles of the latter, and so on. These data may be calculated, or decided by preliminary experiment in any particular case.

As an example, however, of the application of my invention to the recovery of gold bullion from cyanide solutions, I instance the following dimensions of my apparatus: For a flow of from 600 to 800 gallons per hour I find a cone-depth of 5 ft., with a top diameter of 5 ft. also, to be amply sufficient. The diameter of the inlet-pipe is from $1\frac{1}{4}$ in. to $1\frac{3}{4}$ in., according to the head of the inlet liquor, whilst the perforations of the cap-cone, or distributor, are $\frac{3}{8}$ in. in diameter. The charge of zinc fume in such an apparatus varies from 5 lb. to 30 lb., according to requirements.

In order that my apparatus and invention may be more readily understood, I append hereto a diagram, representing a vertical section through such a precipitating cone as before described, and whereof the following are the lettered references: A, inlet-cock; B, precipitating-cone; C, perforated distributor; D, supply-funnel for precipitant; E, check-valve; F, supply for liquor or discharge for rich precipitant operated by a three-way cock; G, check-valve guide-rod, also giving independent control of valve; H, cone overflow; J, precautionary filter-screen for precipitated liquors; K, collecting-launder; L, outflow for same; M, inlet-pipe; N, cock for emptying cone after use; P, level (variable) of bulk precipitant on filling in before liquor-inflow.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. The use of a precipitating apparatus of constantly-increasing area in a vertical direction, whereby the vertical upward flow of a liquor or solution introduced at the bottom of such becomes continually slower until the deposition or subsidence of any suspended particle of solid precipitating agent becomes possible against such greatly-reduced current, substantially as described.

2. The use in combination with such apparatus of known solid precipitants, for the solutions of precious metals, when in a more or less finely-divided condition, substantially as described.

3. The use of two or more such apparatus placed in series for the purpose of utilising to any required degree the precipitating power or capacity of the precipitating agent used, substantially as described.

4. The combination of such apparatus with other known types of depositing or subsidence apparatus, substantially as described.

5. In such apparatus, the use of a tangentially or otherwise perforated distributing-cone for breaking up inflow-liquor, substantially as described.

6. In such apparatus, the use of a smaller cone inverted towards the greater cone, but not touching the same, providing thus a "mixing-chamber" with an annular outflow, substantially as described.

7. In such apparatus the use of a filter-screen at the top thereof to retain floating or buoyed-up particles of precipitant, substantially as described.

Dated this 21st day of August, 1896.

W. E. HUGHES,
Agent for the Applicant.

AN IMPROVED PROCESS FOR THE TREATMENT OF METALLIFEROUS ORES AND PRODUCTS.

I, Edgar Arthur Ashcroft, of 34, Queen Street, Melbourne, in the Colony of Victoria, electrical engineer, do hereby declare the nature of my invention for "An Improved Process for the Treatment of Metalliferous Ores and Products," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—