

through a corresponding hole in a bevel wheel D, which is supported in a casting *d* resting upon bearers or beams *d*¹ extending across from side to side of the vat A.

This construction admits of rotary motion being imparted to said spindle B, and yet allows of its being raised or lowered as required. For this latter purpose a screw-threaded rod E is connected to the end of said spindle by a shackle *e*, and is fitted with a corresponding threaded pinion *e*¹, in gear with a second pinion *e*² having a crank-handle *e*³. Steps *f* are provided leading up to a platform F in a convenient position over the centre of the vat, to enable the crank-handle *e*³ to be operated. Rotary motion is imparted to the stirrers by the bevel gearing *g*, *g*, and a clutch *g*¹ (see Figure 1*a*) to connect or disconnect said gearing as required. H, H represent the projections which are provided upon the inside of the wall of the vat A for the purpose of imparting a series of eddies or swirls to the material in the vat, so as to more thoroughly bring the whole of such material in contact with the solvent solution. These projections may be made integral with said vat, or may be attached thereto. As will be readily understood, I represents the vertically-sliding valve which is used for drawing off the solvent solution from the vat A. It is arranged to be slid up and down in a frame *i* by means of a screw-threaded rod *i*¹, so that it can be opened more or less according to requirements. J, Figure 2, represents a waste discharge-valve which is fitted in the lower part of the vat, and enables the *débris* therein to be discharged after it has been treated and the gold-bearing solution has been drawn off. If preferred, a series of discharge-pipes might be used for this purpose instead of the valve, stoppers or plugs being withdrawn from said pipes as required.

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 combination and arrangement of parts constituting the herein-described machine for use in the extraction of gold from auriferous material by the aid of chemical solvents, the whole being constructed and arranged substantially as and for the purposes specified, and as illustrated in the accompanying drawings.

2. In a machine for use in the extraction of gold from auriferous material by the aid of chemical solvents, agitators or stirrers projecting from a shaft or spindle (such as B), capable of being adjusted vertically, and being rotated by suitable gearing, substantially as and for the purposes specified, and as illustrated in the accompanying drawings.

3. In a machine for use in the extraction of gold from auriferous material by the aid of chemical solvents, a vat having projections (such as H) around the inner side of its walls, substantially as and for the purposes specified, and as illustrated in the accompanying drawings.

4. In a machine for use in the extraction of gold from auriferous material by the aid of chemical solvents, a valve (such as I), together with means whereby it may be adjusted vertically in the side of the vat, substantially as and for the purpose specified, and as illustrated in the accompanying drawings.

Dated this 21st day of May, 1896.

JOEL JAMES DEEBLE.

AN IMPROVED REGENERATIVE PROCESS FOR THE TREATMENT OF ARGENTIFEROUS SULPHIDE ORES.

I, Ernest Frederick Turner, of the Adelaide University, in the Province of South Australia, analytical chemist, do hereby declare the nature of my invention for "An Improved Regenerative Process for the Treatment of Argentiferous Sulphide Ores," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to the treatment of argentiferous sulphide ores, and more particularly zinciferous sulphide ores, galena, and argentiferous galena, containing gold and other metals. It has for its object the extraction of the several metallic contents, together with the utilisation of certain products of the process for the regeneration of the materials employed therein, and for the obtaining of certain by-products of commercial value.

In my invention the raw sulphide ore is disintegrated by the action of hydrochloric acid (HCl), resulting in the formation of metallic chlorides, which are subsequently fused and the metals recovered, and in the production of sulphuretted hydrogen (H₂S), which is used as fuel, and the products of its combustion utilised for the production of fresh supplies of HCl. From the H₂S so produced not only are fresh supplies of HCl obtained during the process by the treatment of sodium-chloride with the sulphur-dioxide (SO₂) resulting from the use of the H₂S as fuel, but also from the sodium-chloride certain by-products in the form of caustic soda and other soda products. Portions of such products are used for the recovery of the metals from the aqueous chlorides obtained in the first part of the process, and any excess can be dealt with for commercial purposes.

In order to make my invention entirely clear I propose to explain the same by the accompanying drawings, in which is shown apparatus for carrying it into effect.

The sulphide ore as taken from the mine-floors, and without reducing it to a finely-divided state, is placed in suitable vats or digesters A, lined with copper or other suitable material capable of resisting the action of corrosive acids. These digesters A, with their accompanying appliances, as hereinafter described, are arranged in series of any suitable number, and they may be of any suitable size. They are provided with gastight lids, and their bottoms are covered with copper gratings A¹, arranged in three tiers one over the other. The openings in the gratings are graduated, the topmost being largest, so that only fine particles of ore can pass through the lowest one into a crucible B placed below. These crucibles B are provided with heating apparatus C¹, which consists preferably of gas-jets supplied from a gasometer N through the pipe C, as hereinafter more particularly described.

The digesters A having been charged with raw sulphide ore, and the gastight covers replaced, aqueous HCl is introduced from a storage-tank D, and sprayed into the upper portions of the digester A, whilst at the same time HCl gas from a generator E is discharged immediately