

UNITED STATES PATENT OFFICE.

CALVIN C. KNOWLES, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN PROCESSES FOR AMALGAMATING GOLD.

Specification forming part of Letters Patent No 7,546, dated August 6, 1850.

To all whom it may concern:

Be it known that I, CALVIN C. KNOWLES, of Lowell, in the county of Middlesex and State of Massachusetts, have discovered a new and useful Improvement in the Process of Separating Gold, &c., from Sand, Quartz, and other Earthy Matter; and I do hereby declare that the following is a full and exact specification of the same, wherein I have set forth the nature and principles of my said discovery and improvement by which it may be distinguished from others, together with what I claim and desire to have secured to me by Letters Patent.

It has been clearly found by experiments made by myself and others, and can be seen by the use of a powerful microscope, that gold cannot be thoroughly separated from the sand, quartz, or other earthy matter in which it is found in a natural state by the ordinary "mercurial process," as it is termed. There is, as I have found, some repulsive or other cause which prevents the perfect and entire amalgamation of all the particles of gold with the quicksilver. To remove this cause has been the object of much research and many experiments with me upon various quantities of sand and earth in which gold is contained, and which has been taken from various localities in the gold regions of California. The discovery which I have made effectually removes this repulsive cause, if such it be, and has enabled me to obtain from the gold-sand by my improved process, after it has passed through the process above referred to and now generally practiced, from twelve to two hundred percent. more gold than can be procured by the said mercurial process.

The improvement in the separating process which I have discovered consists in applying to the sand or pulverized quartz with which the gold is connected or intermingled a solution of chloride of sodium and tartaric acid in soft water. The chloride of sodium and tartaric acid should be mixed together in about equal proportions, and one ounce of the mixture makes a suitable solution in one quart of water.

The process of working with the above-specified solution is as follows: After the sand or

other earthy matter with which the gold is mixed has been washed in the usual way and the stones and larger particles of gold removed, it should be thoroughly dried. Then take a quantity of the sand—say two or three quarts, according to the size of the pan used—place it in the vessel, and wet it just to dampness with the chemical solution prepared as above specified. Allow it to stand for a minute or two, and then pour in from four to eight ounces of quicksilver and intimately mix them together. If the quicksilver is all dispersed and no large globules remain, more quicksilver should be added, until the sand is completely saturated and the quicksilver remains in large collections. Water should then be poured in until the sand can be easily washed about in all directions. The pan and its contents should then receive a proper vibratory motion until all the small globules of silver collect into one mass. Then introduce more water, until all the sand is washed out at one corner of the pan and the quicksilver remains with the gold in amalgam. This amalgam of quicksilver and gold should now be put into a bag of buckskin or other porous leather and the redundant quicksilver pressed out. Then take the amalgam from the buckskin, place it in the iron retort properly prepared, and heat the retort to a full red heat, the end of the retort-tube being under water in a convenient receiver. The quicksilver will be sublimed into the receiver and the gold will remain in the retort.

By the use of a dilute acetic acid in the process in lieu of the solution above specified, I have obtained similar results; but the action of this upon the mercury creates an offensive and deleterious smell and other objectionable effects.

By saturating the sand or pulverized quartz in which gold is found with the solution of chloride of sodium and tartaric acid, allowing it to stand for a few hours, and applying heat, a partial decomposition takes place, and all adherent particles of gold will be free to unite with the quicksilver, and by going through with the entire process, as above described, the sand, &c., is thoroughly decomposed or disintegrated, and the gold entirely liberated.

Having thus described my improvements in the process of separating gold, &c., from sand and other earthy matter, what I claim as my discovery, and desire to have secured to me by Letters Patent, is—

Saturating or dampening the sand or quartz with which gold is found with a solution, in soft water, of chloride of sodium and tartaric

acid mixed in about equal proportions and applied to the sand, &c., prior to the introduction of quicksilver to effect amalgamation with the gold.

CALVIN C. KNOWLES.

Witnesses:

JOHN A. KNOWLES,
DAVID DUTTON.