

# UNITED STATES PATENT OFFICE.

WILLIAM LONGMAID, OF BEAUMONT SQUARE, ENGLAND.

## IMPROVEMENT IN REDUCING GOLD MINERAL.

Specification forming part of Letters Patent No. 9,187, dated August 3, 1852.

*To all whom it may concern:*

Be it known that I, WILLIAM LONGMAID, of Beaumont Square, in the county of Middlesex England, gentleman, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Obtaining Gold; and I, the said WILLIAM LONGMAID, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof—that is to say:

The invention consists of treating certain minerals containing gold in such manner that the quartz or other silicious earthy or ferruginous minerals are fused, so as to form a fluid vitreous slag or scoria, from which the gold from its density is precipitated to the bottom of the slag. The material I submit to this treatment may consist of quartz or silicious earthy or ferruginous minerals, also limestone, calcareous clay, or sand, oxide of iron, or other earthy matters, either or all of which contain gold. It is better in the first place to reduce such materials to a size that will pass through a sieve of three or more holes to a linear inch, provided such materials are to be wrought in a reverberatory furnace; but if an ordinary blast-furnace is used I do not break or reduce the materials so small.

I will now describe the manner of performing the operation.

Having selected the minerals to be treated, such minerals consisting of quartz or silicious matters, I mix therewith an alkaline earthy base or alkaline and ferruginous bases or oxides of manganese, oxide of lead, or other compound of lead; a small quantity of fluor-spar may also be added, to render the slag more fluid, or not, as may be convenient to the operator. I also prefer that such minerals be selected as contain gold—such as quartz, limestone, oxide of iron, calcareous clay, or marl; but when the minerals other than quartz or silicious minerals do not contain gold, I prefer to use carbonate of lime or caustic lime and oxide of iron, to which may be added fluor-spar or not, at the option of the operator, and the minerals are to be mixed in such proportions as will produce a fluid slag when subjected to the action of heat in a furnace. To one hundred parts, by weight, of

quartz or silicious mineral containing gold I add twenty-five parts of oxide of iron, seventy parts of carbonate of lime, or forty-five parts of caustic lime. I place a charge of one or two tons of the mixed minerals on the bed of a reverberatory furnace, and having closed the aperture through which the furnace is charged, I subject the mixed minerals to the action of a white heat, and continue the operation until the mass is reduced to a fluid slag. Toward the close of the operation I stir the charge with iron rakes or other tools, taking care when the charge is rich in gold not to force the tools so low into the slag as to disturb the gold at the bottom of the slag by bringing such tools into contact with it.

When the charge is sufficiently wrought, which will somewhat vary according to the nature of the charge or other circumstances, but which will usually be completed in about six to ten hours, of which the operator will easily judge, it may sometimes be convenient to allow the gold of several charges to accumulate in the furnace. When it is necessary to withdraw the metal, I open the top hole by knocking away the clay that has been used to stop the hole. I run the gold into a receiver. (An inverted iron cone will be a suitable receiver.) I carefully line it with clay to prevent the adhesion of the gold to the iron.

My object in using iron tools is twofold: first, by this means I mix the materials more intimately, and thereby produce a better fusion; and, secondly, if any minute particles of gold remain suspended in the slag, they are collected on the iron tools, or the gold may be wholly collected in this manner, and which I prefer to do when the minerals are poor in gold. I prefer to run off the slag at a higher level in the furnace than that from which I draw the gold. When I separate the gold in part or wholly by means of metal tools in the manner above described I immerse such tools, while red hot, in a bath of lead, when the gold is immediately separated from the tools and combines with the lead, from which I separate it by cupellation. I prefer to use such minerals as contain gold in making the mixture for the furnace for the obvious reason that by their mutual reaction they are solvents for each other. The ashes of burned wood may sometimes be added with

advantage, the alkaline matters of such ashes having a tendency to produce a more fluid slag. When all the gold is not readily precipitated by its density, which will sometimes be the case, I add oxide of lead or some compound of lead in sufficient quantity only to combine with and take up the gold, in which case the lead first combines with the slag from which it is reduced by the addition of carbon, and I prefer to use oxide of lead or some compound of lead in all cases when the minerals contain sulphur, at the same time increasing the proportion of oxide of iron. When I use lead for

the purpose of separating the gold wholly or in part the lead so obtained is to be cupelled.

I do not claim the use of lime when forming fluxes; but

What I claim is—

The use of iron, substantially as described, to extract portions of gold when the same are not readily precipitated by their density.

WILLIAM LONGMAID.

Witnesses:

JAMES McCURLEY,

JOSEPH MARQUETTE,

*U. S. Consulate, London.*