

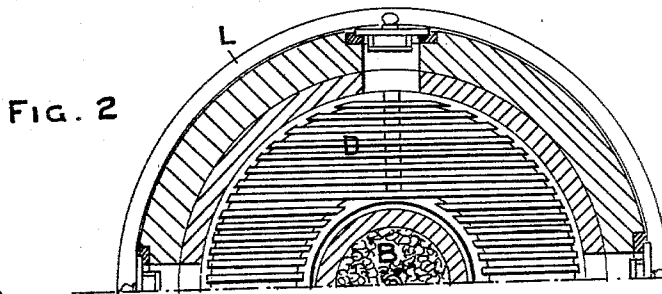
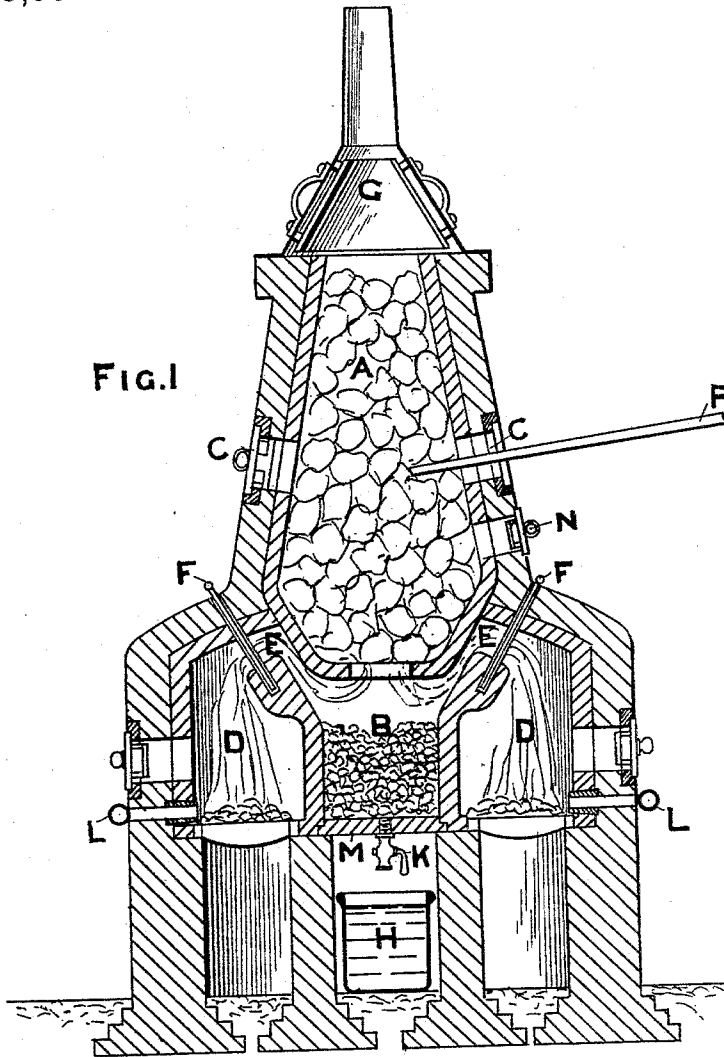
(No Model.)

A. GUTENSOHN.

PROCESS OF AND MEANS FOR DISINTEGRATING QUARTZ.

No. 583,993.

Patented June 8, 1897.



Witnesses

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UNITED STATES PATENT OFFICE.

ADOLF GUTENSOHN, OF LONDON, ENGLAND, ASSIGNOR TO LOUIS HENRY GOODMAN, JOSEPH EDWARD LILLEY, AND JOHN CHAPMAN, OF SAME PLACE.

PROCESS OF AND MEANS FOR DISINTEGRATING QUARTZ.

SPECIFICATION forming part of Letters Patent No. 588,993, dated June 8, 1897.

Application filed July 29, 1896. Serial No. 600,913. (No model.) Patented in South African Republic June 25, 1896, No. 1,152; in France July 13, 1896, No. 258,056; in Austria July 27, 1896, No. 46/4,461; in Hungary July 27, 1896, No. 6,626; in Spain July 28, 1896, No. 19,423; in Cape Colony August 7, 1896, No. 587/1,199; in Natal August 10, 1896, No. 64; in New Zealand August 17, 1896, No. 8,749; in Victoria August 19, 1896, No. 13,398; in South Australia August 20, 1896, No. 3,365; in New South Wales August 21, 1896, No. 6,827; in Tasmania August 22, 1896, No. 1,694; in Brazil September 11, 1896, No. 2,124, and in Orange Free State September 28, 1896, No. 89.

To all whom it may concern:

Be it known that I, ADOLF GUTENSOHN, residing at London, England, have invented an Improved Process of and Means used therein
5 for the Disintegration of Quartz and Similar Minerals, (for which patents have been granted in South African Republic, No. 1,152, dated June 25, 1896; in France, No. 258,056, dated July 13, 1896; in Austria, No. 46/4,461,
10 dated July 27, 1896; in Hungary, No. 6,626, dated July 27, 1896; in Spain, No. 19,423, dated July 28, 1896; in Cape Colony, No. 587, folio 1,199, dated August 7, 1896; in Natal, No. 64, dated August 10, 1896; in New
15 Zealand, No. 8,749, dated August 17, 1896; in Victoria, No. 13,398, dated August 19, 1896; in South Australia, No. 3,365, dated August 20, 1896; in Tasmania, No. 1,694, dated August 22, 1896; in Brazil, No. 2,124, dated Sep-
20 tember 11, 1896; in Orange Free State, No. 89, dated September 28, 1896, and in New South Wales, No. 6,827, dated August 21, 1896,) of which the following is a specification.

25 My invention relates to the gradual disintegration of quartz or similar minerals as they are raised from the mines; and it consists in the process employed therefor and in the means devised to carry the said process into
30 effect.

At present quartz or similar ores are reduced in bulk to a certain size by powerful crushing machinery and then carried to the stamping-batteries to be reduced to fine
35 powder.

The object of my process is to substitute for the crushing machinery a cheaper and more effective treatment which, carried out in successive stages, leaves the quartz or simi-
40 lar mineral in such a disintegrated or friable condition that the final reduction to powder is most easily accomplished by cheaper and more rapidly-acting machinery than stamping-machines, or where it is desirable to util-

ize the latter the work can be accomplished 45 in, it is estimated, one-tenth of the time now required for the purpose.

I am aware that heat and sudden chilling have been tried for breaking up the large lumps of quartz as they come from the mine, 50 but the crude way of attempting this up to the present time has resulted in loss of metal and waste of fuel without the desired result having been achieved.

My process and means used are as follows: 55 I heat the quartz or similar ore in a chamber or retort from which the external atmosphere is excluded. The fuel is applied externally to the said chamber, so that the fuel does not mix with the ore, and the gases of combustion only are admitted. The intensity of heating obtained is graduated from the bottom of the chamber upward, so as to provide stages in the reduction of the size of the pieces toward the bottom of the chamber by 65 successive heating and chilling. The fuel may be of any suitable kind—such as coke, wood, or coal, or oil may be applied by a spray apparatus. Steam is passed through 70 the fire, and some pieces of iron are exposed in the fire at red heat, so as to cause the development of hydrogen with water-gas, thus rendering the gases of combustion non-oxidizing to the ore and metals therein, but rather reducing them, if associated with oxygen or 75 sulfur, to their metallic condition, the sulfur when present passing off as sulfureted hydrogen. I may mix charcoal also with the quartz to still more increase the reducing quality of the gases of combustion. 80

When the quartz is bright red or almost white hot, I chill it with cold water poured over from the top or inserted by supply-pipes. The water is allowed to run off through the bottom of the lower chamber. The quartz is 85 thus caused to split into smaller fragments, the smaller pieces being worked down or dropping into the lower part of the chamber, where

they are afterward exposed to a higher grade of heat. This chilling process upon the ore in the chamber is repeated several times, the ore being permitted to regain red heat during the intervals, the dampers being closed during the chilling intervals and the steam-supply to the fire being stopped.

When the quartz has been sufficiently broken up by the repeated chilling with cold water in the chamber, the lower portion of smallest fragments is permitted, when at a white heat, to drop from the lower portion of the chamber or furnace into cold water placed in a tank below, and thus becomes thoroughly rotten or friable, so that it may be crushed by the pressure of the fingers. This friable product containing all its original metal, which has been more or less freed by the above treatment, is easily converted into the finest powder by beaters, rolls, or stamps with the greatest ease and quickness, and the recovery of the precious metals from the ore is thus greatly facilitated.

A convenient apparatus for carrying out my process is as follows:

Figure 1 is a vertical section of my chamber or furnace. Fig. 2 is a plan of the same.

A is the upper part of the chamber or furnace, and B the lower portion, in which the smaller particles collect as the quartz is stirred about by bars P, inserted through apertures C, provided for the purpose. The heat is applied from an external furnace and grates D where coke or fuel is used, the gases of combustion entering through the passages E into the ore, the passages being provided with dampers F and so disposed that the quartz cannot enter them. The upper part of the furnace is closed with a movable hood G and the lower part of the furnace with a sliding door M, from which the finer pieces of quartz when white hot may be discharged into the water-tank H underneath. This sliding door is supplied with a cock K, to allow the water to escape from the interior of the furnace when supplied for chilling purposes and which may be poured from the top or by pipes inserted in the apertures C C and N. Steam is supplied to the fire by steam-pipes L.

The furnace A may be of brick or metal, lined with fire-brick, and the chambers A and B (shown divided) may be in one with the external heating-furnaces carried up around the whole of the internal retort or chamber.

The water used in chilling can be collected and used again after cooling, or such part as is evaporated can be collected by condensation.

If it should prove more economical to prevent the cooling of the furnaces by not injecting streams of water therein, I may alternatively carry out my process by dropping the heated quartz when at white heat without previous chilling in the furnace into the external water-tank H, receiving the ore upon

gratings or sieves in the said tank, by which the ore may be lifted from the tank and the water drained off, the ore being returned to the same or another of a series of furnaces for further heating and disintegration.

Where the quartz is mixed and covered with argillaceous material which hardens under heat, I find it extremely advantageous to use sulfate or bisulfate of soda dissolved in the cooling-water of injection or in the water of the chilling-tank, or I may soak the ore in a solution of sulfate or bisulfate of soda before placing it in the furnace for my process of disintegration.

I am aware that heating and quenching quartz ore, either in the open or in furnaces, has been practiced and that hydrogenized products of combustion have been used, but in all cases, as far as I am aware, the said processes have always resulted in the deterioration of the particles of gold by surface impurities, so that it cannot afterward be amalgamated with the same facility as before the ore was so treated. The essence of my improvement in the process and in the appliances to be used therewith is that while avoiding oxygenation of the ore by a hydrogenized reducing atmosphere I allow these only to pass through the upper portion of the burden where the material is not more than red-hot, and that I treat the ore to white heat by radiant heat alone without contact with either oxidizing, hydrogenized, or carbonized gases, and thus obtain a product very friable and upon which the gold may be amalgamated with the same ease as before treatment.

What I claim is—

1. A process for the cracking and rendering friable of quartz ore without deterioration of the contained gold for after amalgamation, consisting in heating the ore as to its upper portion to dull-red heat by reducing or hydrogenized products of combustion, and as to its lower portion to white heat by radiant heat alone without contact with air, products of combustion or free hydrogen; chilling the ore repeatedly *in situ* and finally dropping the finely-divided pieces of ore when white-hot into cold water, substantially as described.

2. An apparatus for the disintegration of quartz, comprising a closed chamber A, with a lower opening for the discharge of the quartz and the inlet of heat, a chamber B directly beneath the first chamber to receive the disintegrated quartz therefrom, and a furnace surrounding the walls of the chamber B, with passages therefrom over the walls of said chamber B to the chamber A, substantially as described.

3. An apparatus for the disintegration of quartz, comprising a closed chamber A, with a lower opening for the discharge of the quartz and the inlet of heat, a chamber B directly beneath the first chamber to receive the dis-

integrated quartz therefrom, a drain-opening
in the bottom of the chamber B, a removable
door M to chamber B, a tank beneath the
same and a furnace surrounding the walls of
5 the chamber B with passages therefrom over
the walls of said chamber B to the chamber
A, substantially as described.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

ADOLF GUTENSOHN.

Witnesses:

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CHARLES H. CARTER.