

KROLL Adolphe (Jr)

(1882 - 1970)

Tilleur (BE)

Patents (details)

1 - Nouveau mode d'agglomération de diverses matières pulvérulantes

FR patent	444979
Application date	21 May 1912

L'invention consiste en un nouveau procédé pour l'agglomération de mines fines, de poussières de gaz, etc., par leur scorification dans un four vertical, en y ajoutant éventuellement des chlorures, des silicates, des carbonates, des sulfates, etc., qui favoriseraient la scorification ou amélioreraient le produit final, avec récupération d'une partie de la chaleur produite dans ce four vertical.

La mise en pratique du procédé est la suivante:

Dans un four vertical, ressemblant par exemple au cubilot, on produit une haute température dans la partie inférieure, au moyen d'un combustible quelconque, solide, liquide ou gazeux, insufflé avec l'air de combustion, aspiré par la cheminée qui se trouve au bout de l'ensemble de la combinaison du four et de son récupérateur de chaleur.

Dans ce four vertical, on introduit à sa partie supérieure la matière à agglomérer de la façon suivante:

Un tube, légèrement incliné, en fer, acier ou fonte, garni intérieurement au besoin, entièrement ou en sa partie inférieure seulement, de substances réfractaires, sert de chenal conducteur dans lequel on verse, à sa partie supérieure la matière à agglomérer additionnée ou non de combustibles ou d'autres substances, indiquées plus haut.

Ce tube chenal aboutit avec sa partie inférieure sur l'orifice du four vertical dans lequel il déverse son contenu, par suite d'une rotation qu'on lui imprime. La matière à agglomérer tombe ainsi petit à petit dans la haute chaleur du four vertical et comme cette substance a été préparée dans le tube chargeur où elle s'est chauffée au rouge, grâce à une partie de la chaleur produite dans le four vertical et éventuellement par le combustible y mélangé, ladite matière entre en fusion et se concentre dans le bas du creuset du four vertical, d'où on la lâche de temps à autre, en la laissant couler dans des rigoles, etc., pour pouvoir la débiter en morceaux de son choix. C'est ainsi que la chaleur perdue du four vertical est récupérée en grande partie et diminue en notable proportion la consommation du combustible.

(no drawing)

Corresponding patent

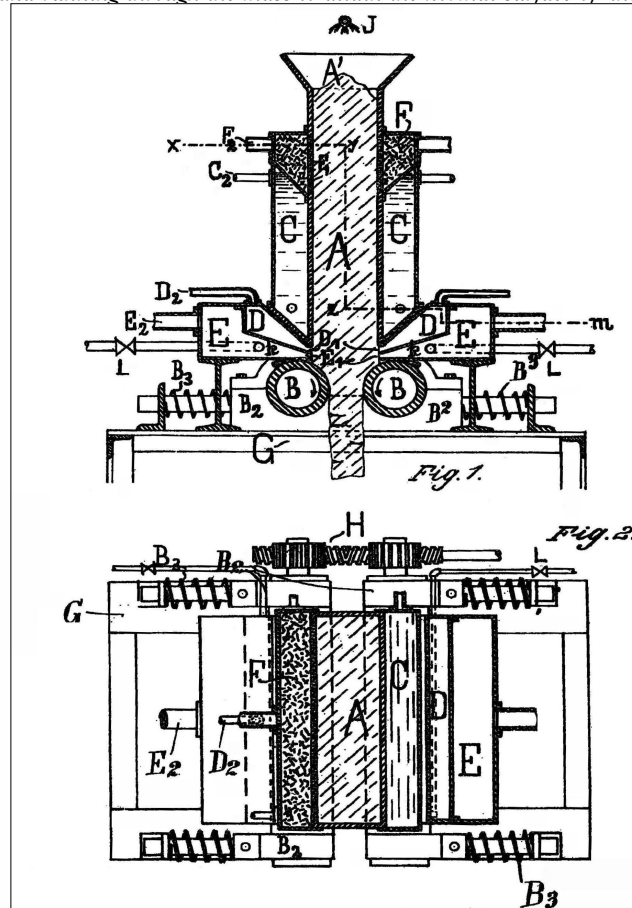
BE

2 - Improvements in and relating to processes of agglomerating finely divided granular or friable materials

GB patent	1912/27762
Application date	2 December 1912

My present process based upon numerous practical experiments permits of realising in a simple and perfect way unknown heretofore, the agglomeration of finely divided granular or friable oxides, metals or flue dust, the oxides being of any degree of oxidation or hydration.

The present invention is for a process of agglomerating a finely divided granular or triable oxides, metals or flue dust and consists in sintering or melting the particles together, the particular feature of said process consisting in introducing at the same moment air and combustible materials which are gaseous, finely pulverised or burning state, or capable of being gasified, into the already heated mass to be agglomerated and producing therein a so-called flameless internal combustion of gases, without making use either for the purpose of previous heating or for agglomerating of a propagative reaction initiated at the normal surface of the exit of the gases and running through the mass to attain the normal surface of the entrance of the gases.



Corresponding patents

FR, US, LU

3 - Method and apparatus of agglomerating metalliferous masses

US patent	1916863
Application date	30 January 1930

This invention relates to the agglomeration by treatment with a gaseous medium and heat, of fine ores and other metalliferous masses in general, not to omit concentrates or residues and the most finely divided fluedusts which are causing great difficulties, if treated in layers of some extent by flowing gas, owing to their resistance to the passage of gases, together with the great mobility of their particles.

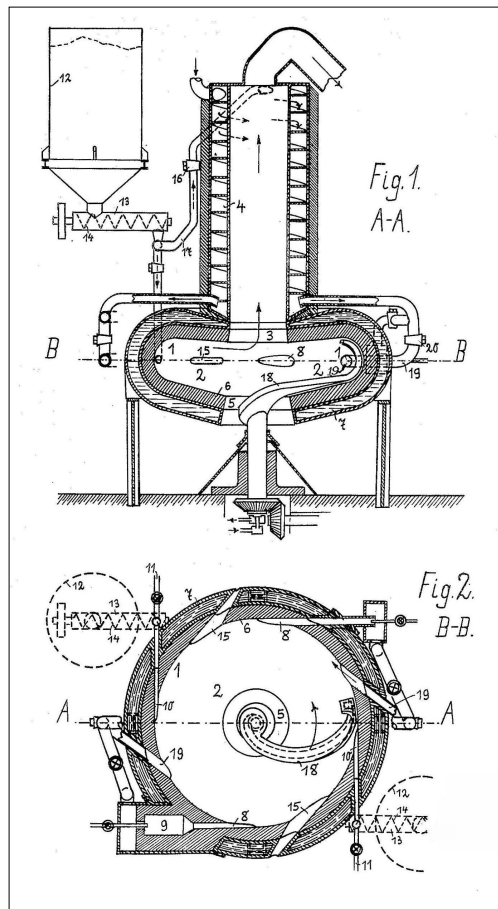
It has already been the purpose of numerous improvements in fine ore treating processes to eliminate these difficulties by causing the fine particles to be freely suspended in the gaseous medium during the treatment. Such means have been tried more especially in the case of agglomerating flue-dust, but always the process has been abandoned, as the apparatus become of enormous dimensions. Furnaces of this kind have even been proposed in the shape of chimneys, wherein the dust freely showered to the bottom.

My invention is based on the same means of suspending the particles of mass in the hot gaseous medium and heating them, so as to undergo agglomeration, but it has the peculiarity of impeding or preventing the fine particles from being carried away by the gas over and beyond a limited space. That is namely obtained by retaining the heavier mass with the aid of centrifugal forces. Indeed, by the production of whirls within

the gaseous medium, or of real dust-tornadoes, there are easily created sufficient centrifugal forces, to retain in a satisfactory manner fine particles of metalliferous masses, even in a most restricted room, whereas the already consumed or somewhat down-cooled gases are free to escape and may be replaced by fresh ones.

The tendency of the particles of agglomerating together, ordinarily originating with the attainment of their softening point, may be considerably supported during the new process, by the violent and often repeated concussions of the said particles between themselves and with the walls.

The agglomerates generated in this manner are withdrawing themselves by free fall or by being swung out from the gas-whirls, not more capable of supporting the same, and leave the furnace automatically if the sole is provided inclined, but they may also remain deposited therein and even occur fixed or pasted to the walls (the bottom included), apt of being removed therefrom by mechanical means, or simply by an increased heating effect. In this latter case they will completely melt down, drop or flow out and leave the furnace as a liquid mass, no matter if melting is continuously prosecuted or only as a momentary proceeding or expedient.



Corresponding patents

DE, LU

4 - Stützvorrichtung im Boden für dünne Stäbe, namentlich Weinbergpfähle

LU patent	20568
Application date	15 May 1934

(copy to be obtained from Archives nationales)

5 - Method of producing lithium salts from lithium minerals

US patent	2662809
Application date	1 May 1950
Assigned to	Geomines: Compagnie Géologique et minière des ingénieurs et industriels belges (“Geomines”, s. à r. l., Manono, Belgian Congo)

It is known that among the lithium ores, those containing the mineral spodumen, i.e. metasilicate of aluminum and lithium, have the lowest solubility, especially when the spodumen is of great purity.

An object of the present invention is to increase the solubility of such spodumen minerals and conduct an efficient extraction of the ore so as to recover a soluble lithium salt content therefrom by combining the features of increasing the solubility with leaching by means of an appropriate aqueous solvent.

The spodumen ore is firstly calcined in admixture with a small amount of alkali-metal or alkaline earth metal oxides, hydroxides or salts forming these oxides during calcination. The calcination brings about a chemical reaction of the mixture, and it is a feature of the invention, that the addition of the oxide material is too small to bring about a sufficient solubility of the calcined product in pure water to readily leach lithium salts thereby as is necessary in industrial application. It is necessary to use an aqueous solvent to leach the calcined product which has not been chemically saturated with the oxide material. The leaching solvent may be a mineral acid such as an aqueous hydrochloric acid but preferably an electrolyte is used, such as an aqueous solution of salts ionized by electrolytical disassociation producing anions of acidic radical, such as the salts of alkali- or alkaline earth metals which may be of acid, neutral or alkaline character and the operation is preferably performed at a temperature over 100° under super-atmospheric pressure.

By calcination of the oxide mixture the natural molecular constitution of the spodumen is altered by chemical reaction to enable the acidic anions of the aqueous electrolyte solution to react promptly and completely upon the calcined product to produce soluble lithium salts by a new chemical equilibrium.

(no drawing)

Corresponding patents

BE, DE US(1)

6 - Method of extracting lithium from its silico-aluminous ores

US patent	2816007
Application date	15 August 1953
Assigned to	Geomines: Compagnie Géologique et minière des ingénieurs et industriels belges (“Geomines”, s. à r. l., Manono, Belgian Congo)

The most interesting methods of preparation and extraction of lithium compounds from the ores of the latter are those which are based, on an exchange of cathodic ions between: the lithium ore and saline ionized reagents, the ore being treated for this purpose with heating either by an aqueous salt solution or without water, by salts melted or softened by heat.

The treatment with an aqueous saline solution necessitates generally the use of an autoclave, an operation rather onerous, whereas the treatment by salts in partial or complete fusion hitherto necessitated an application of high fusion temperatures which entrained considerable losses by volatilization or by scorification and produced secondary reactions on the ore and pollution of the extraction bath. The consumption of the extracting salt was considerable.

The method forming the subject of the present invention concerns the second type of ionic exchange carried out in the dry state with heat and it is mainly characterised by the utilisation of saline reagents which react by very moderate temperatures, by a cationic exchange of metal with the lithium ore. In other words: in lieu of treating the ore mixed with a salt having a relatively high temperature of fusion, such as potassium sulphate (1076° C.), or sodium sulphate (884° C.), or calcium sulphate mixed with quantities of lime (beyond 1100° C.), the lithium ore is treated according to the present invention with a salt such as anhydrous sodium acetate, the melting point of which is only 324° C., or with sodium nitrate (melting point 208° C.), or with sodium chlorate (melting point 248° C.), or other organic mineral salts of this type, which may also be salts of potassium alone or in admixture with others.

(no drawing)

Corresponding patents

BE, DE, LU (2), CA