

# UNITED STATES PATENT OFFICE.

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## MINERAL BRIQUET.

990,049.

Specification of Letters Patent.

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No Drawing.

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*To all whom it may concern:*

Be it known that I, GEORGE K. HOLLISTER, Jr., a citizen of the United States, and a resident of the city of New York, borough of the Bronx, in the county and State of New York, have invented a new and Improved Mineral Briquet, of which the following is a full, clear, and exact description.

The invention relates to metallurgy, and its object is to provide a new and improved mineral briquet, formed of finely divided mineral materials, such as iron ore, found in abundance in sand, low grade iron ores, found in earth, decomposed rock, etc., with a binder, to permit of conveniently, economically and quickly forming the mass into briquets for almost immediate use, in a smelting furnace for smelting the mineral materials. For the purpose mentioned, use is made of a bonding material for holding pulverulent mineral material together, and a hardening material for hardening the briquet.

From experience I have found that oxidation of almost any mineral substance can be readily accomplished by subjecting said material in a pulverulent state to an incandescent temperature in the presence of sufficient oxygen. It is therefore desirable, when using mineral particles as a base, to mix with the same a small quantity of dry powdered clay, so that when the mass is subsequently subjected to pressure in a mold or other machine, the softer and finer particles of the clay readily find their way in between the hard metallic particles, thereby making a firm and solid briquet, with far less chance of waste than if such briquet was made of coarse particles alone, as the latter tend to fracture while under pressure thus rendering the briquet fragile and of poor quality.

In order to form the briquet, I proceed in detail as follows: Say 2,000 pounds of pulverulent mineral material, iron ore concentrates or the like, are mixed with 15 pounds of clay in a dry and pulverized state, and added thereto during the mixing operation are  $3\frac{1}{2}$  gallons of molasses, which has been slightly acidified by the use of 2 ounces of muriatic acid, and while still mixing the ingredients mentioned three gallons of water are added, having dissolved therein 2 pounds of sal-soda and one pound of powdered alum. The mixing is continued a

sufficient length of time to thoroughly mix the ingredients with one another, and the resultant mass is then placed in a pug mill, evenly heated to about 350° Fahrenheit, until the material has lost its wet appearance and feels rather dry to the touch, being, however, in a plastic state, to permit of subsequently briquetting the material into suitable sizes by a briquet-making machine of any approved construction. By the method described, the resultant briquet becomes extremely hard and practically non-breakable, and this important feature is apparently the result of the complete solidification of the acidified molasses, which latter is converted into carbon of a tough structural composition. The sal-soda, alum and clay form a peculiar bond of a very cohesive nature.

The hardening material and the bonding material referred to are very desirable in an iron ore briquet, as, on account of the said materials, the briquet will retain its shape up to almost the point of smelting, therefore the waste is extremely small, at the same time causing no choking or retarding of the smelting process. It will be noticed that the briquet described is free from those materials which make a binder for pulverulent mineral materials so costly, thus preventing said briquets from being actually used.

The briquets formed as above described are comparatively cheap and practically as good as the mineral in the natural state, and consequently it is possible to utilize an enormous amount of natural mineral material such as described, which has heretofore been undesirable for smelting purposes.

It is understood that the briquets after leaving the briquet-making machine can almost immediately be placed in the smelting furnace, it being understood that the bonding and hardening materials hold the pulverulent mineral materials together while under sufficient heat to smelt the same.

In practicing the invention with iron ore concentrates and the like, it has been found expedient to modify to some extent the amount of the ingredients used for forming the binder, as more or less of such ingredients may be used, and the method of mixing may be altered according to the absorbent quality of the mineral materials to be treated.



Instead of the bonding material being formed of clay, alum and sal-soda, use may be made of clay containing alum in the natural state and sal-soda or ammonia or other alkalis. The alum used may be chrome alum, and instead of a carbohydrate use may be made of a mixture of carbohydrates, preferably a low grade molasses, and an acid, preferably, however, muriatic acid, as above stated.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. As an article of manufacture, a mineral briquet comprising a pulverulent mineral material, a bond, and acidified molasses.
2. As a new article of manufacture, a mineral briquet, comprising a mineral base, clay, alum, an alkali, and an acidified carbohydrate, as described.
3. As a new article of manufacture, a

mineral briquet, comprising a mineral base, clay, alum, sal-soda, and an acidified carbohydrate, substantially as specified.

4. The herein described method for the manufacture of briquets of pulverulent mineral materials, consisting in mixing the pulverulent material with a bonding material of clay, alum and sal-soda, and adding to the mixture a hardening material in the form of acidified molasses, working the materials into a plastic mass under application of heat, and finally molding the plastic mass into briquets.

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

GEORGE K. HOLLISTER, JR.

Witnesses:

THEO. G. HOSTER,  
JOHN P. DAVIS.