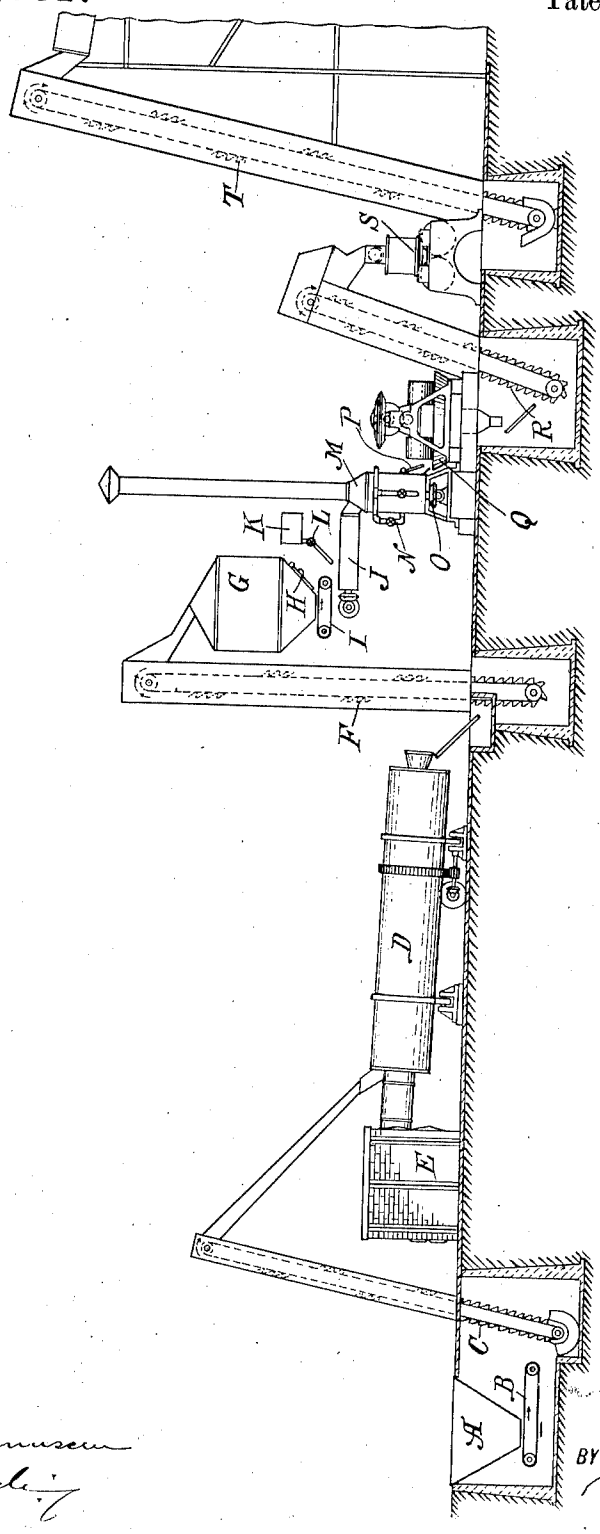
F. A. VOGEL.

BRIQUETING OF ORES.

APPLICATION FILED OCT. 26, 1918.

1,334,331.

Patented Mar. 23, 1920.



WITNESSES

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BRIQUETING OF ORES.

1,334,331. Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed October 26, 1918. Serial No. 259,804.

To all whom it may concern:

Be it known that I, FELIX A. VOGEL, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in the Briqueting of Ores, of which the following is a specification.

Innumerable attempts have been heretofore made to incorporate fine ore particles in briquets and the present invention relates to a new method which in many respects is superior to those heretofore employed. The present invention differs primarily from the known methods of briqueting in that the medium relied upon to give solidity to the briquet and to cause coherence is a non-briquetable substance, to wit, carbon, preferably coal or coke. The presence of such coal in the briquet is valuable from a metallurgical standpoint but the coal is not present in the briquet in the usual form of a mere admixture or in the condition of an added ingredient but is present in the form of a binding element, which by itself imparts the characteristic of coherence and permanence to the blocks.

In order to carry my invention into practice, the coal and ore are worked upon in an apparatus which is capable of grinding, mixing and masticating the materials under treatment. An apparatus adapted for this purpose is a masticator but of special construction in which the crushing wheels should have very wide rims and preferably center discharge so that they shall not only have the capacity of crushing and grinding by reason of their weight but shall effect a mixing and masticating of the different components of the mixture, the product being continuously withdrawn as the same is rendered fit for briqueting. The effect of this treatment is not only to crush the particles and to mix them together but to intercompound them. Mere grinding and mixing will not produce the result, but the grinding and mixing must be conducted on such conditions that while the particles are undergoing reduction in size they are additionally moved relatively to each other under considerable pressure, as for example by the use of a set of heavy wide-rimmed wheels whose connecting axles are centrally pivoted with respect to the bed. Inasmuch as these wheels are heavy and are running in a circular direction over the bed and the rims are wide, the outer edge of each wheel moves over a longer line than the inner edge of the same wheel by virtue of which fact a masticating or intercompounding effect is produced upon the particles of coal and ore. When these particles are thus intercompounded the result which I aim at is brought about. There should be added to the mixture some additional substance, such for example as tar or oil, which is fluid in the mill and which during the grinding, mixing and masticating operation is worked into the coal particles. This ingredient is added in quantities appropriate to the coal used and although it may in itself have some binding capacity is not present for any such purpose, being insufficient in amount to support the briquet structurally, while sufficient to cause the coal when masticated with it to acquire the binding quality required to hold the briquet together. This ingredient may for convenience be referred to as a stimulant for the operation. The result of the grinding, mixing and masticating treatment is to bring the entire mass into a condition where it is plastic and readily shapeable into cohering bodies, the entire mixture having acquired a cementing facility which upon pressing and hardening of the briquets causes them to become permanent.

In place of tar there may be employed some other ingredient which may or may not possess in itself a binding property and practically any mineral, chemical, carbonaceous or catalytic material which under the conditions described will set up binding conditions in the coal, may be employed. Additional material, catalytic, adhesive or inert, may of course be added or may be present in the ore and the presence or absence thereof does not affect the present invention so long as these added ingredients do not destroy or supplant the function of the masticated coal as the uniting or cementing agency in the briquet.

The proportions of the respective ingredients are obviously to a large extent subject to the preference of the operator, although the ore will always be present as the dominant ingredient, with the coal in the bound condition as the ingredient second in order of volume. In a finished briquet the tar

or equivalent means relied upon for the purpose of securing proper operating conditions during grinding, mixing and masticating, is a relatively negligible quantity.

In the drawing I have illustrated a convenient arrangement of apparatus by the use of which the process may be carried out. The materials to be briqueted are introduced into the hopper A, the belt B carries the material to the conveyer C. It is then introduced into one or more rotary driers D, to which heat is supplied from the oven E. The dried warm and mixed material passes from the driers to the conveyer F by means of which the material is brought to the bin G. This bin is provided with a gate H by means of which the discharge can be regulated. The belt I carries the material which escapes through the gate H into the paddle mixer J. A supply of oil or other stimulant is maintained in the tank K and the amount thereof added in the paddle mixer is controlled by the cock L. The material under treatment at this stage is warm and dry. From the paddle mixer J the material enters the fluxer M to which steam is supplied from the header N. The gearing O operates paddles in the interior of the fluxer M. From the fluxer the material passes through gate P into the masticator Q. From the masticator, in which the material is reduced to a condition of coherability, it is carried by the elevator R to the briqueting press S. The briquets are then carried by a further elevator T to a drier or storage bin.

What I claim is:

1. An ore briquet consisting of material hardened from a condition of plasticity and comprising a major portion of fine particles of ore uniformly mixed, intercompounded and permanently held and bound into a briquet by means of finely ground and intermasticated coal.

2. The process of briqueting ores which consists of subjecting a major portion of finely divided ore, together with coal and a stimulant therefor, to an intimate grinding, mixing and intercompounding operation until the entire volume of material under treatment is converted into a coherable mass possessing a cementing facility, forming said mass into briquets and allowing same to harden.

3. The process of making briquets in which coal is the agent to cause coherence in the briquet, which consists in warming and drying the particles of coal, mixing with regulated proportions of the dry coal a restricted quantity of a stimulant, subjecting the mixture to the action of moisture and then subjecting the moistened material to an intimate grinding, mixing and intercompounding operation until the entire volume of material under treatment is converted into a coherable mass possessing a cementing facility and then forming said mass into briquets.

In testimony whereof I have hereunto set my hand.

FELIX A. VOGEL.