

No. 751,399.

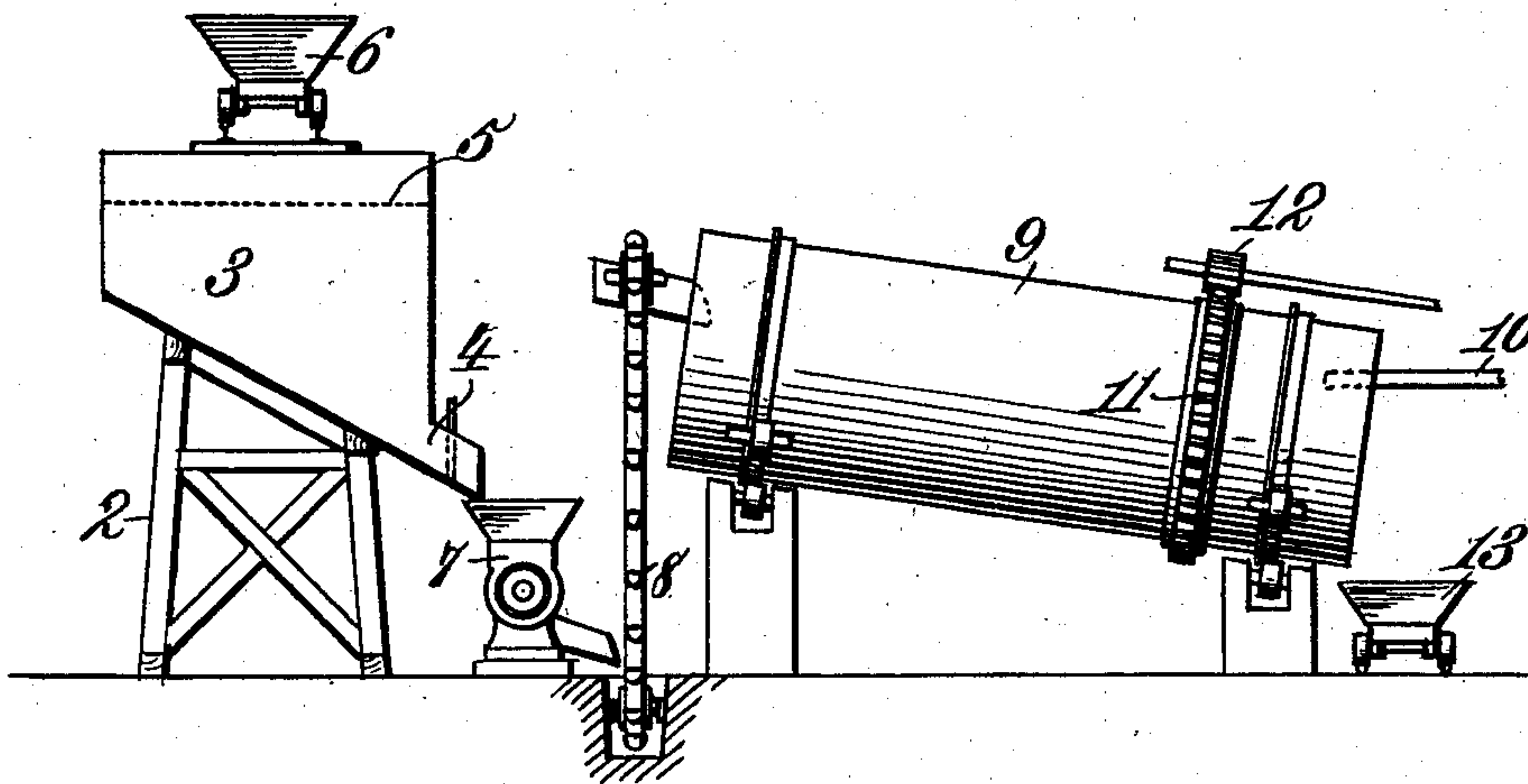
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G. R. JOHNSON.

PROCESS OF RECLAIMING FLUE DUST.

APPLICATION FILED AUG. 27, 1903.

NO MODEL.



Witnesses.
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UNITED STATES PATENT OFFICE.

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PROCESS OF RECLAIMING FLUE-DUST.

SPECIFICATION forming part of Letters Patent No. 751,399, dated February 2, 1904.

Application filed August 27, 1903. Serial No. 171,009. (No specimens.)

To all whom it may concern:

Be it known that I, GUY R. JOHNSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Processes of Reclaiming Flue-Dust, of which the following is a specification.

This invention relates to a process of reclaiming flue-dust.

In the treatment of certain kinds of ores in blast-furnaces a large amount of dust is carried out of the flues thereof from one cause or another. In some cases the ejection of this dust from the furnace is caused by outgoing gases generated during the treatment of the ore.

In the manufacture of pig-iron the use of Mesaba ore is increasing year by year, owing to its cheapness. This kind of ore, however, is very fine, much of it going through a hundred-mesh screen. The consequence is that there is a great loss of the ore on the passage of gases through the furnace, which gases carry considerable quantities of the fine ore up into the flues. This impalpable substance that is carried out of the furnace by such gases is known as "flue-dust." Instead of throwing away this flue-dust, as has ordinarily been the custom, I collect it and subject the same to the process hereinafter described and save what has been generally considered waste material.

My process consists in mixing the flue-dust with a binder and then subjecting the mixture to heat to fuse together the binder and metallic particles in the flue-dust into a compact mass, and in the present case the mixture while under the action of heat is agitated, so as to form the same into lumps or nodules, which can be subsequently placed in a blast-furnace without possibility of the same being carried out of the flues by gases generated therein.

The flue-dust is composed of a mixture of carbon, fine coke, semicarbonized ore, and ore still unacted upon by the action of the gases, and in the subjection of the dust to heat in a kiln or oven, as contemplated by my invention, the carbon in the mass is heated and by

contact and radiation heats the metal in such mass and binder to facilitate their fusion and adherence. Any suitable binder or flux may be employed for securing the agglomeration or coalescing of the metallic particles; but I have found salt in practice to be a desirable agent for this purpose. In fact, there is some lime in the flue-dust, which aids in the union of the metallic particles.

Of course any suitable apparatus may be employed for carrying out the process. In the drawings I have illustrated diagrammatically a convenient organization for this purpose.

Referring to the drawings, the numeral 2 denotes a frame or support of some suitable kind surmounted by a bin or hopper 3, the discharge-spout 4 of which is provided with a hand-operated gate or sluice to control the discharge from the hopper. Within the bin or hopper 3, near the top thereof, is a screen 5. The flue-dust is usually collected at the bottom of a blast-furnace in a dust-catcher. I propose to remove the flue-dust from the dust-catcher and deliver it into cars, as 6, traveling along suitable tracks and from which the flue-dust is delivered into the upper open side of the hopper or bin 3 and to the screen 5, the mesh of which is of a size to prevent large pieces of coke and other foreign substances passing through the same. These large substances may be removed and subsequently recharged into the furnace. The fine material or flue-dust proper falling from the screen passes through the discharge-spout 4 of the hopper into a pug-mill or equivalent mixing device, as 7, and while in the same is intimately mixed with a suitable binder, such as common salt. The mixture flows from the pug-mill 7 by way of a trough into the buckets of an endless chain or elevator, as 8, by which latter the same is delivered into the inlet of a kiln or oven, as 9. The dust and binder while in the oven are subjected to the action of heat of suitable temperature, which practice has determined may be from 1,800° to 2,000° Fahrenheit. The heat slightly fuses the metal particles in the flue-dust and the binder, which, as previously indicated, may be salt, so as to cause these

elements to coalesce, producing a hard compact mass or cinder. The heat may be applied in any desirable way. For this purpose I have shown a gas-burner 10 projecting into the kiln at what might be considered the discharge end thereof. While the mixture is in the kiln or oven it is subjected to agitation in order to form the mass into lumps or nodules which are hard and compact and are of such weight that when placed in a blast-furnace they cannot possibly be projected therefrom by the ascending gases. To facilitate the feed of the mixture through the kiln 9, it is set at an inclination, and the agitation of such mixture to bring about the formation of the lumps may be secured by rotating the kiln, and for this purpose it is shown as being of cylindrical form, suitably supported and surrounded by a large ring-gear 11, operated by a suitably-actuated pinion 12. By varying the speed of rotation of the kiln the size of the cinders or lumps can be governed, the lumps being of smaller size when the kiln is driven at a low speed than when at a high one.

As hereinbefore set forth, the flue-dust contains lime, which, as is known, is an excellent flux and which when the mass within the kiln is fused aids the salt in binding the metallic particles together. Such flue-dust also contains carbon, which when heated heats by contact and radiation the metallic particles and the binder, so as to quicken the fusion thereof. The cinders or lumps when formed are delivered from the rotary kiln or oven into cars, as 13, by which they may be trans-

ported when cooled to a blast-furnace for treatment therein.

Of course other apparatus may be adopted for carrying out my process, it not being my intention to limit myself to the use of that illustrated, the same being shown merely to indicate the nature of the invention.

Not only does the process possess the advantages hereinbefore set forth, but it materially increases the metal secured from the ore over the ordinary processes.

Having thus described the invention, what I claim is—

1. The process of reclaiming flue-dust, which consists in mixing the same with salt, then subjecting the mixture to heat to fuse the salt and the metallic particles in the flue-dust into a compact mass, and subjecting the heated mixture to agitation to form the mass into lumps.

2. The process of reclaiming flue-dust which consists in mixing the same with salt, then subjecting the mixture to heat of approximately 1,800° to 2,000° Fahrenheit, to fuse together the salt and metallic particles in the flue-dust into a compact mass, and subjecting the mixture to agitation to form the mass into lumps.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GUY R. JOHNSON.

Witnesses:

W. H. GEISMAN,
EMIL HANEMAN.