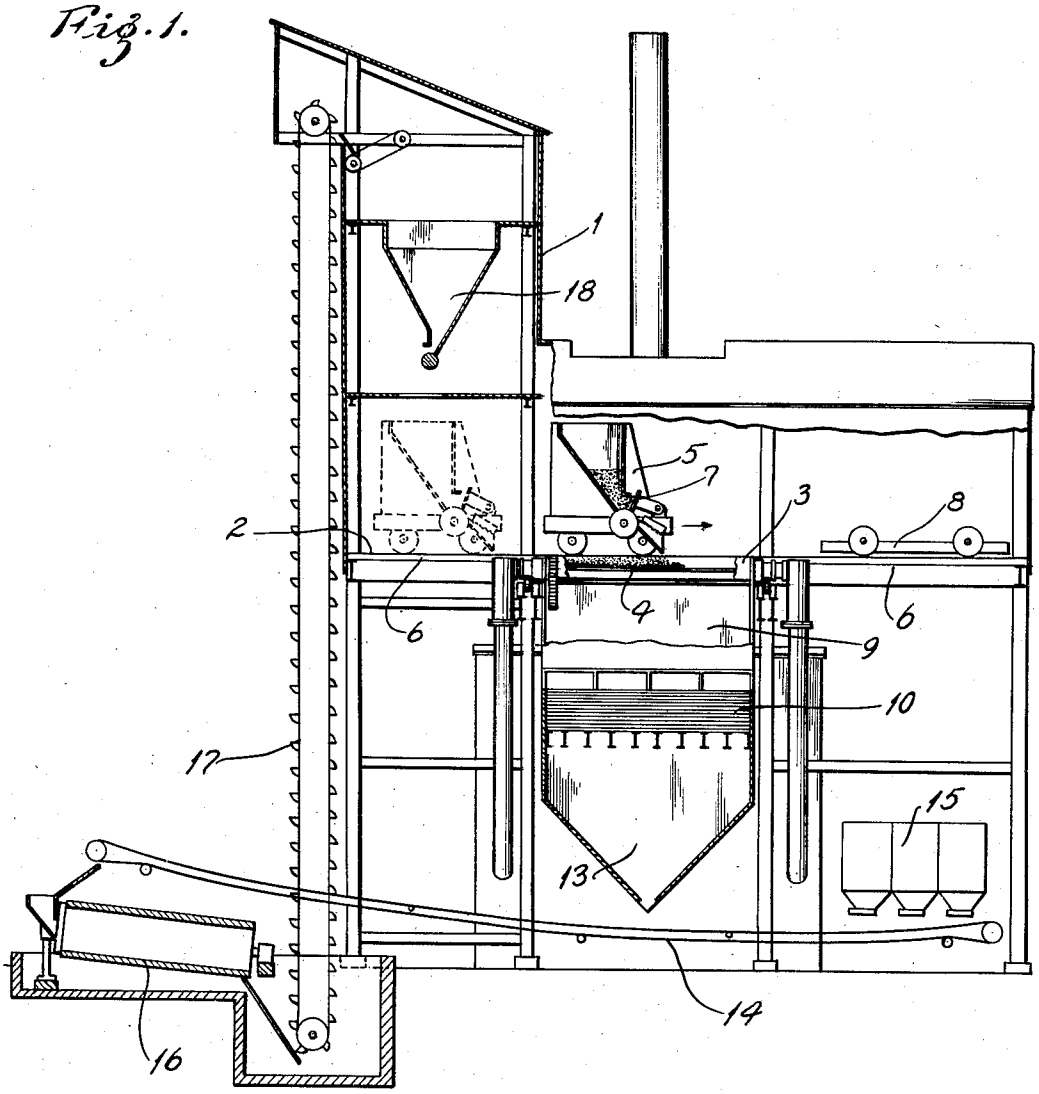
Dec. 14, 1926. 1,610,424

M. O. CEDERQUIST

METHOD OF HANDLING MATERIAL TO BE SINTERED

Filed Feb. 5, 1926 3 Sheets-Sheet 1

Fig. 1.



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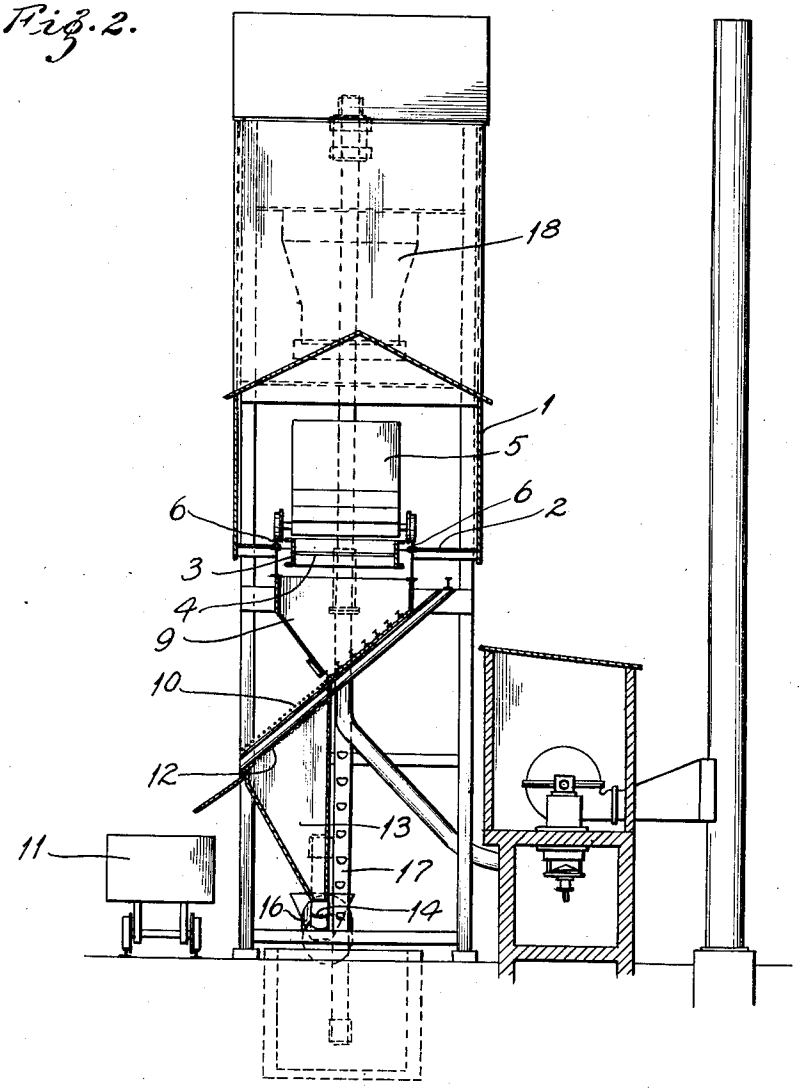
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Fig. 2.



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Fig. 3.

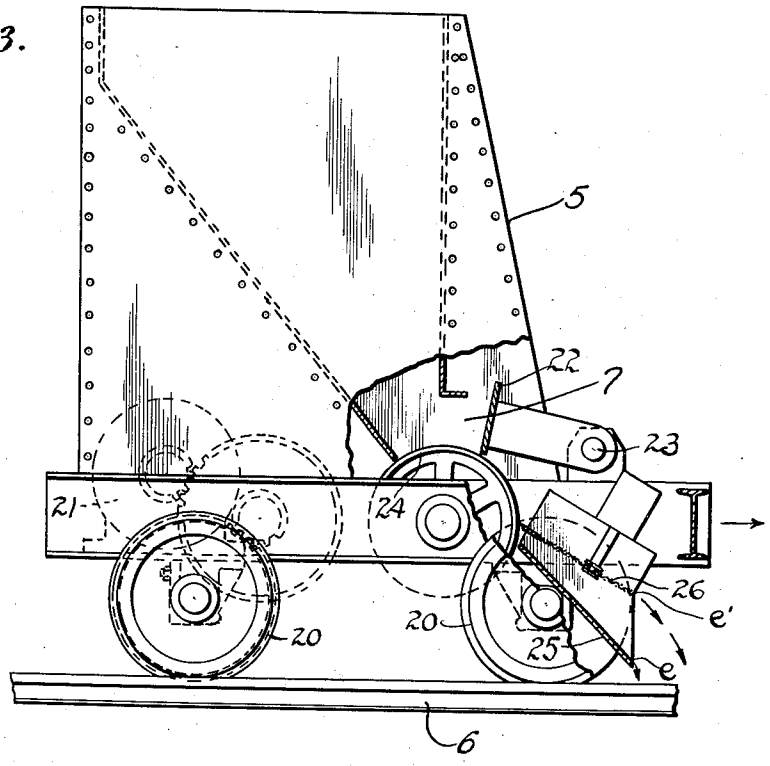
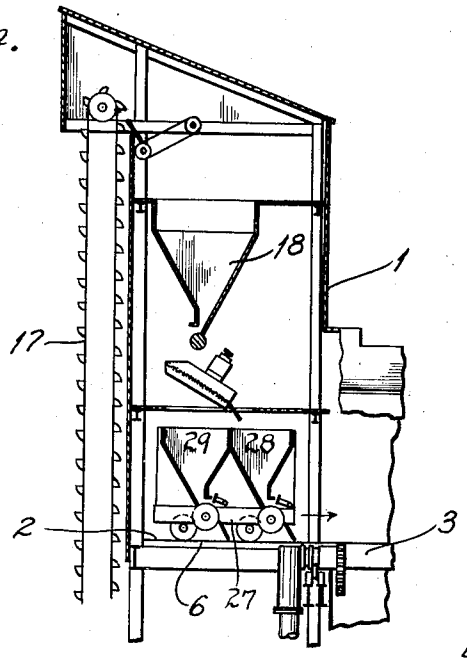


Fig. 4.



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Patented Dec. 14, 1926. 1,610,424

UNITED STATES PATENT OFFICE.

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METHOD OF HANDLING MATERIAL TO BE SINTERED.

Application filed February 5, 1926. Serial No. 85,269.

My invention has relation to improvements in methods of handling material to be sintered, such material, as is well known in the art, producing a better sintered product if the particles thereof are of substantially uniform size. In order to better understand the invention, it may not be amiss to briefly describe the usual preliminary steps of preparing the mixture of fine material that is to be sintered for the purpose of agglomeration.

It is the custom to first prepare a mixture consisting of one or more kinds of finely divided metal-bearing material or ore, fuel, and what are termed "returned fines" (that is fine material that has already gone through the sintering operation and been screened from the main part of the sintered charge). These various constituents are thoroughly mixed in a suitable mixing apparatus and moistened to the proper consistency for sintering, the degree of moisture having been previously experimentally determined. This mixture of finely divided materials is now ready for the sintering equipment and under the practice heretofore in effect is either fed directly on to the grate of the sintering apparatus or on a porous bed of foreign material which has first been charged on the grates. Under the present methods of feeding the charge on the sintering apparatus, no attempt is made to separate the relatively coarse particles from the mixture which are inevitably present throughout the whole charge, producing a greater porosity in some parts of the charge than in others. The result of such non-uniform porosity is that during the sintering operation, the air blast will pass more readily through the more porous spots resulting in a quick localized sintering action. These sintered spots are more permeable to the air than the unsintered parts of the charge and the rushing of the air through such sintered parts causes a retardation of the air blast through the unsintered parts of the charge with the consequence that the charge dries and does not thoroughly sinter, leaving pockets of unsintered material after the sintering operation is completed and the charge dumped. Obviously the unsintered material is dumped in the same condition that it was charged and produces undesirable fines in the sintered product which have to be returned to be again mixed with the charge for further treatment. It is among the objects of this invention to reduce to the very lowest point the quantity of fines thus produced as it is obviously an item of considerable expense to handle this material over and over again in the sintering apparatus.

A further object of the present invention is to separate the relatively coarse particles from the prepared charge to be sintered and feed such coarse particles on the sintering apparatus grates ahead of the finer particles so that the coarser particles may lie directly on the grates, the finer particles resting on the coarser particles thus obtaining from the charge itself, material for constituting what may be termed a porous hearth. The entire material is handled as a unit until just prior to being deposited on the sintering apparatus when it is divided into its relative constituents of fine and relatively coarse material by suitable mechanism (preferably a screen).

It is important in sintering to thus charge the material on the sintering apparatus because it is a physical impossibility to deposit an absolutely uniform layer of mixed ore or other material to be sintered on the grates (or other porous hearth), and the foregoing method of arranging the material in the apparatus very greatly assists in a uniformly sintered material in less time.

When the mixture to be sintered is handled (that is separated and charged) as above described prior to the sintering action, the particles constituting the charge are more uniform in size and in consistency in both horizontal and vertical planes with the result that the porosity of the charge is also more uniform from top to bottom and side to side. A charge possessing such uniformity will consequently burn more uniformly throughout, resulting in an approximately completely sintered mass with a minimum of fines to be returned.

A typical sintering plant arranged to handle the materials comprising the sintering charge as above described, is shown in the accompanying drawings in which Fig. 1 is a side elevation of the sintering plant, the apparatus comprising the plant being shown more or less in outline; Fig. 2 represents an end elevation of the plant; Fig. 3 is an en-

larged view of the charge car provided with a suitable screen for separating the finer particles in the charge from the coarser particles and arranged to feed the coarser particles in advance of the finer particles so that the coarser particles will lie immediately on the grate of the sintering pan while the finer particles will lie upon the coarser particles therein; and Fig. 4 is a side elevation of a portion of a sintering plant showing a modification of the apparatus for handling the material which is separated into its relatively coarse and fine components before being fed to the charge car, the latter being provided with two compartments in which said components are received.

Referring to the drawings, 1 represents a suitable structure provided with a floor 2, on the level of which a sintering pan 3 is rotatably mounted, said sintering pan having a grate 4 within it on which a charge to be sintered is fed by a charge car 5. The charge car is adapted to travel on a track 6, and as it passes over the pan 3, the material is caused to discharge from the mouth 7 of said car into the pan in a manner to be described in detail hereinafter. An igniting hood 8 is also adapted to travel on the track 6 so that it may be superposed on the pan in order to ignite the charge therein. After the charge within the pan has been sintered, the same is rotated to effect a dumping of the charge into the hopper 9 from which the sintered material is from time to time discharged onto a coarse screen 10 which operates as a shoot to direct the material into a railroad car 11 adjacent thereto. Obviously, there is some material as has above been explained that either has not been sintered or if sintered, remains in a very fine condition and a second fine screen 12 is disposed below the screen 10 for the purpose of separating out this fine material and allowing the same to discharge into a "returned fines" bin 13. The material in the "returned fines" bin must be returned to the sintering pan for further treatment and for this purpose it is fed as desired onto a belt conveyor 14 which also conveys the various components of the sintering charge, stored in bins 15, to a suitable mixer 16 wherein these components are thoroughly mixed and moistened to the proper degree for the most effective treatment in the sintering pan. From the mixer the charge is fed to an elevator 17 and lifted to the feed bin 18 from which the charge is fed into the charge car 5 for delivering to the sintering pan 3.

The various mechanisms comprising the plant just described with the exception of the charge car, are old and are all utilized in connection with a complete sintering plant. I do not wish to be understood as restricting a sintering plant to precise mechanism and arrangement herein shown, such arrangement being merely typical in a sintering plant wherein the intermittent type of sintering apparatus is used.

The charge car 5 is of the same general principle as that shown in Patent No. 1,104,491, issued to John E. Greenawalt, except that it is mounted on wheels 20, 20 which ride in the track 6, and is self-propelled by a motor 21. A gate 22 is positioned over the mouth 7 and is pivoted on a shaft 23 so that it may be moved out of the way when material is to be discharged from said mouth. A feed roller 24 assists to discharge the material evenly from the mouth 7. Below the mouth 7 is a discharge chute 25 and somewhat above the chute 25 is a screen 26, the inclination of the screen being slightly less than that of the chute but the lower edges e and e' of the chute and screen being in alinement. As the material is discharged from the mouth 7 of the charge car 5, it will first lodge on the screen 26 and the finer particles will pass therethrough onto the chute 25, the coarser particles rolling over the screen and discharging over the edge e' thereof. The finer particles will slide down the chute 25 and discharge over the edge e thereof somewhat behind the coarser particles (Fig. 3). As the charge car moves over the holder 4, the coarser particles will discharge therein just ahead of the finer particles and will be lodged directly onto the grate 4 forming a porous bed on which the finer particles will be lodged to make up the complete charge.

Obviously, when a two compartment car such as 27 (Fig. 4) is used, the operation is the same since the compartment 28 containing the coarser material precedes the compartment 29 containing the finer material.

Having described my invention, I claim:

1. The method of handling materials in a finely divided state preparatory to sintering, which consists in thoroughly mixing said materials, moistening said mixture, separating said mixture into two components of relatively fine and coarse particles, and immediately depositing the component of coarse particles into a treating holder, and depositing the component of finer particles on the coarser particles for sintering.

2. The method of handling materials in a finely divided state preparatory to sintering, which consists in thoroughly mixing said materials, moistening said mixture, separating said mixture into two components of relatively fine and coarse particles, and depositing the component of coarse particles into a treating holder, and depositing the component of finer particles on the coarser particles for sintering.

3. The method of handling materials in a finely divided state, the particles of which are of non-uniform size, for subsequent sintering, which consists in thoroughly mixing said materials, moistening the mixture, sep-

arating said moistened mixture into two components of relatively fine and coarse particles, lodging said components in separate charging hoppers, and thereafter separately charging said components into a treating holder.

4. The method of handling materials in a finely divided state, the particles of which are of non-uniform size, for subsequent treatment which consists in thoroughly mixing said materials, moistening the mixture, feeding said mixture into a charging apparatus, and separating the mixture into two components of relatively fine and coarse particles as said mixture is discharged from the charging apparatus to the treating vessel, and causing said components to be deposited in the treating vessel progressively, the component of coarse particles being deposited in advance of the component of fine particles.

5. The method of handling materials in a finely divided state preparatory to sintering, which consists in moistening and mixing said materials, separating said mixture into two components of relatively fine and coarse particles, depositing the component of coarse particles into a treating holder, and depositing the component of fine particles on the coarse particles for sintering.

6. The method of handling materials in a finely divided state and containing a certain degree of moisture preparatory to sintering, which consists in thoroughly mixing said materials, separating said mixture into two components of relatively fine and coarse particles, and thereafter depositing the coarse and fine particles substantially in layers in a treating holder.

In testimony whereof I hereunto affix my signature.

MILTON O. CEDERQUIST.