

No. 865,658.

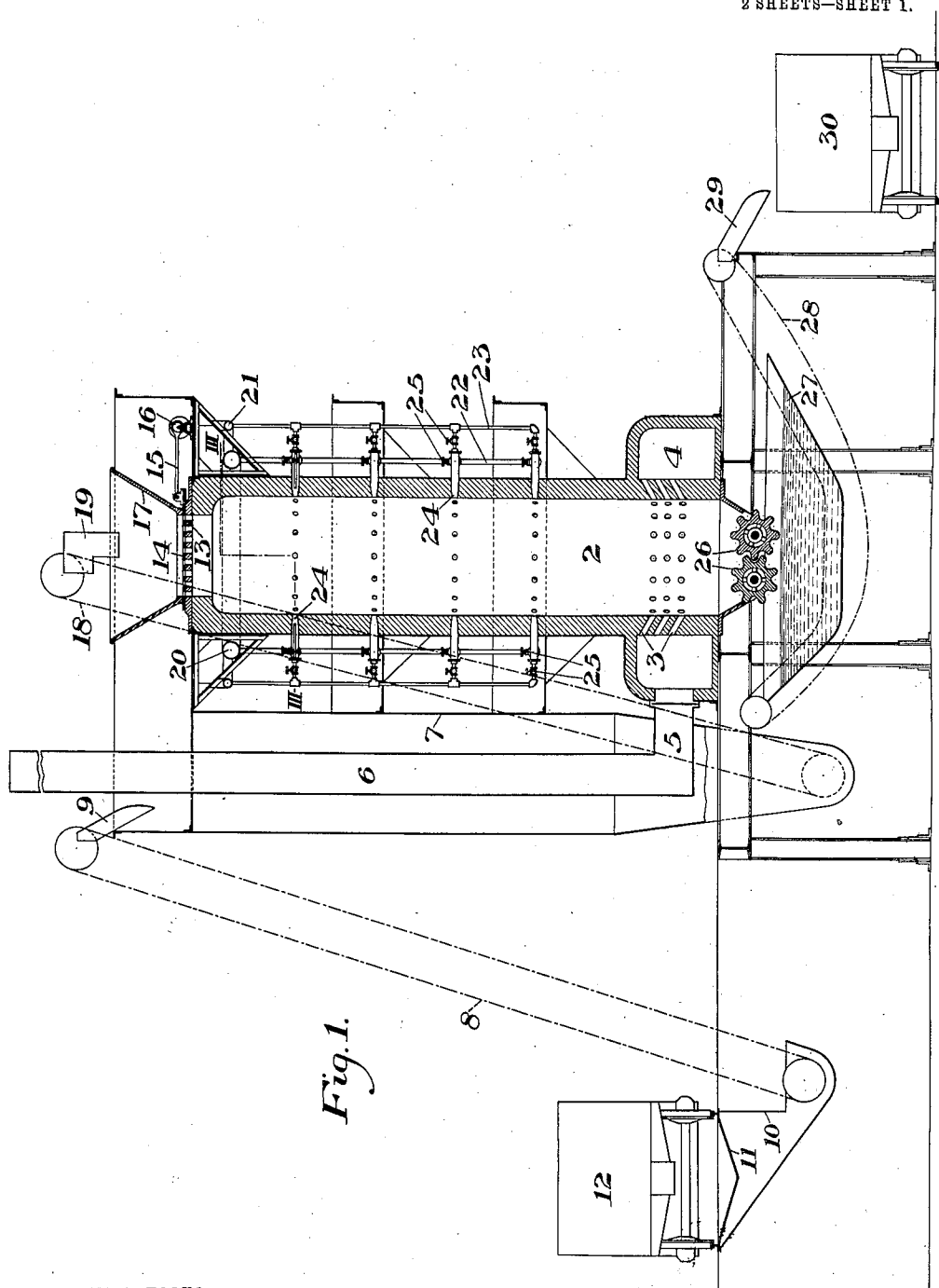
PATENTED SEPT. 10, 1907.

J. SCOTT.

METHOD OF SINTERING ORES.

APPLICATION FILED OCT. 13, 1906.

2 SHEETS—SHEET 1.



WITNESSES

W.W. Swartz
R.A. Balderson.

INVENTOR

James Scott,
By Bakewell & Byrnes,
His Attys.

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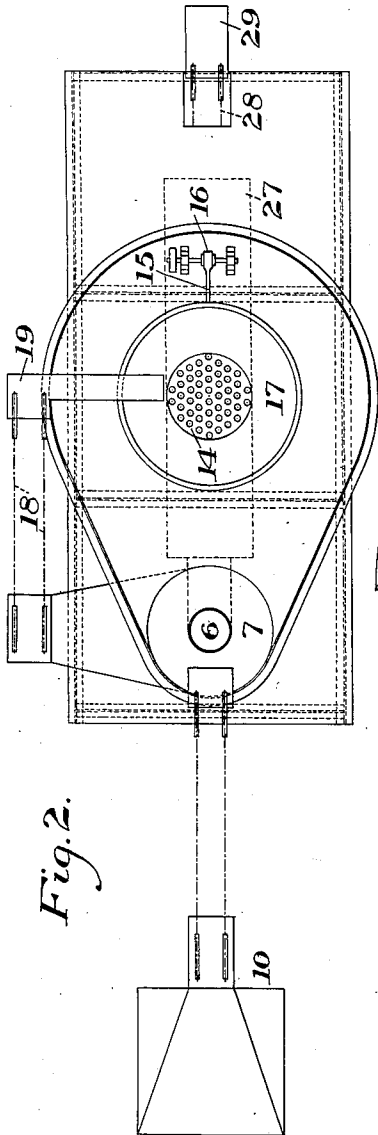


Fig. 2.

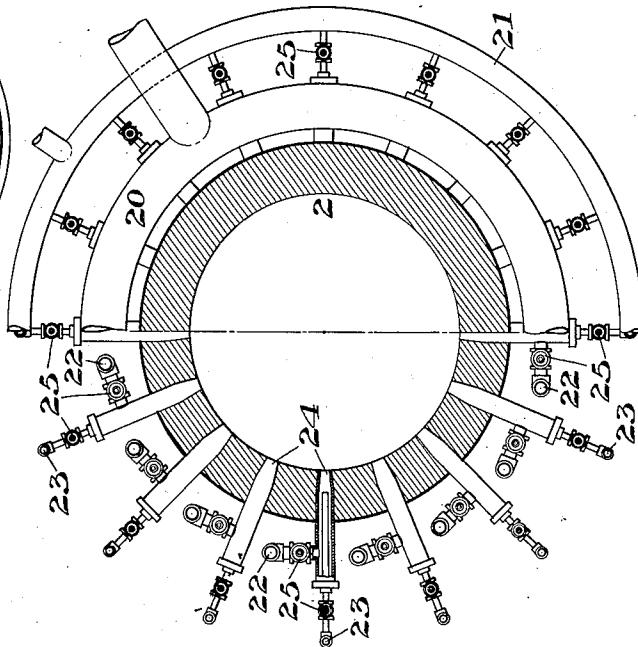


Fig. 3.

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UNITED STATES PATENT OFFICE.

JAMES SCOTT, OF PITTSBURG, PENNSYLVANIA.

METHOD OF SINTERING ORES

No. 865,658.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed October 13, 1906. Serial No. 338,738.

To all whom it may concern:

Be it known that I, JAMES SCOTT, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Method of Sintering Ores, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional side elevation showing an apparatus constructed in accordance with my invention; Fig. 2 is a top plan view, and Fig. 3 a horizontal section on the line III—III of Fig. 1.

My invention relates to the agglomerating or sintering of finely divided ores, especially the flue dust of blast furnaces for making pig iron.

The object of the invention is to provide an improved method whereby this finely divided ore or flue dust can be rapidly and cheaply agglomerated and formed into masses which will not blow out in the blast furnace and will properly support the charge during the descent by its own fusion.

In carrying out my invention, I drop the finely divided ore or flue dust in a shower through a furnace chamber, into which burners project in annular series at different levels, the heat being so regulated that the ore will be partially fused and sintered during its drop through this chamber. The burners substantially provide annular sheets of flame at different levels, through which the showering ore must drop. The bottom of the chamber is preferably provided with a feed-out device, which will aid in forming the partially fused material into lumps and discharge them. I preferably feed out these lumps or masses into a water bosh, from which they may be carried into a car or receptacle, preferably by means of a conveyer which passes through this water bosh.

In the drawings, in which I show a preferred form of apparatus for carrying out my invention, 2 represents a vertical and cylindrical furnace chamber, which may be built in an ordinary form of a metal inclosure with a refractory lining, the chamber having an annular series of outlet openings 3 near its lower end for the products of combustion which enter the annular chamber 4 from which the pipe 5 leads to the stack 6. I have shown this stack as located within an annular drying chamber 7, into which the flue dust may be fed by a conveyer 8 and chute 9. I have shown this conveyer as leading from a hopper 10 having a screen 11; and over the hopper leads a track on which the cars 12 carrying the dust may be passed. The car is brought over the hopper and the discharge door is opened, the flue dust is charged into the hopper while the screen stops any coke or large lumps.

The top of the furnace chamber is provided with a cast plate 13 having a series of small openings which register with corresponding holes in a reciprocating

gate or slide 14 in one position thereof. This gate is reciprocated horizontally by any suitable connections, such as the eccentric rod 15 leading from the eccentric 16 on a power-driven shaft. The slide moves between the feed-plate 13 and a hopper 17, into which the dried flue dust may be discharged by the conveyer 18 and chute 19. If the drying of the dust or fine ore is not desired, or necessary, it may be fed into the hopper or boot from which the conveyer 18 leads up.

Around the upper end of the furnace are located bustle pipes 20 and 21, gas being fed to the pipe 20, while hot air under pressure is fed to the pipe 21. From each of these bustle pipes depend a series of branch feed pipes 22 and 23 and supplying annular sets of burners 24, of which I have shown four series at different levels. Valves 25 may be employed to control the supply of gas and air, to each burner, so that the annular sheets of flame at the different levels can be controlled and regulated as to direction and volume.

The bottom of the furnace is formed by an annular hopper plate having an opening closed by corrugated rollers 26. These rollers are driven by any suitable connection, and as they turn in opposite directions toward each other they serve to compact and form the partially fused material into lumps as they feed it out. I preferably mount these rollers on yielding bearings so as to avoid breaking them and provide for the discharge of larger or smaller lumps. Below the furnace bottom I preferably mount a water bosh 27, through which extends a conveyer 28. This conveyer leads to a chute 29 discharged into car 30. The lumps or masses of partially fused material are fed into the water bosh, and thereby cooled, and are then fed out to the car, by which they may be taken to the blast furnace or other point of use.

In the use of the apparatus, the feed-slide at the top of the furnace is reciprocated at a substantially uniform rate of speed, and thereby the flue dust or fine ore is dropped through the chamber at a substantially uniform rate. The carbon in the flue dust is consumed by the oxygen of the annular sheets of flame, thus assisting in the agglomeration, the heat being regulated in any desirable manner. As the material showers down from the furnace, its temperature is increased until it is partially fused before reaching the bottom. This partially fused material is continuously fed out by the corrugated rollers, in the form of clinker or sintered lumps. If the flue dust is wet, or for any reason needs drying, this is carried out by the heat from the stack of the furnace itself. The draft is preferably downward through the furnace, as shown, thus avoiding injury to the feeding-in device, and improving the action.

The advantages of my invention result from the partial fusing of the showered ore or flue dust in the manner shown, the operation being rapid, and being carried

- out without the use of hand labor. It will be noted that the furnace is not filled with a burden of material but is simply a clear open furnace space through which the material showers or drops. This enables the heat to be properly applied, and greatly assists in the sintering or clinkering action. The feed-out rolls assist in forming and compressing the material into lumps, while the use of the water-bosh enables the material to be discharged at once into the cars.
- 10 Instead of the corrugated rolls, a refractory deflector with plain-faced rollers below it, may be employed; and many other variations may be made in the form and arrangement of the apparatus, without departing from my invention.
- 15 I claim:—
1. The method of sintering fine ores or flue dust, consisting in dropping the finely divided ore in a shower through an open furnace chamber, subjecting it therein to the action of flames, and compacting and feeding out the partially fused ore at the bottom; substantially as described.
 2. The method of sintering fine ores or flue dust, consisting in dropping the finely divided ore in a shower through an open furnace chamber, subjecting it therein to the action of flames at different levels, causing a down-draft through said furnace, and compacting and feeding out the partially fused ore at the bottom; substantially as described.
 3. The method of sintering fine ores or flue dust, consisting in dropping the finely divided ore or flue dust in a hopper through a furnace chamber, subjecting it to flame action therein to partially fuse it, and feeding out the material at the bottom of the furnace into a water-bosh; substantially as described.
 4. The method of sintering fine ores, or flue dust, consisting in dropping the finely divided ore or flue dust in a shower through a furnace chamber, subjecting it to flame action therein to partially fuse it, and compressing and feeding out the lump material into a water-bosh; substantially as described.
 5. The method of sintering fine ores or flue dust, consisting in dropping the ore or flue dust while cold in a shower through the furnace chamber, bringing it into contact with a series of rows of flame and gradually heating the ore or dust and partially fusing it and feeding the partly fused material out of the bottom of the furnace into a water bosh; substantially as described.
 6. The method of sintering fine ores or flue dust, consisting in dropping the ore or flue dust while cold in a shower through the furnace chamber, bringing it into contact with a series of rows of flames and gradually heating the ore or dust and partially fusing it and then compacting, and feeding the partly fused material out of the bottom of the furnace; substantially as described.
- In testimony whereof, I have hereunto set my hand.
- JAMES SCOTT.
- Witnesses:
 GEO. B. BLEMING,
 JOHN MILLER.