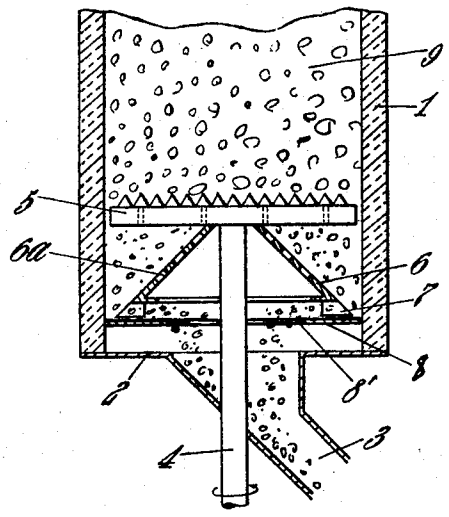
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SOLID MATERIAL WITHDRAWING ARRANGEMENTS FOR VERTICAL FURNACES

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SOLID MATERIAL WITHDRAWING ARRANGEMENTS FOR VERTICAL FURNACES

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In vertical furnaces as used heretofore the loose material fed into the top is raised to such a temperature that agglomeration takes place and the customary device for extracting the material at the bottom is a crushing grate which will break up the agglomerated material, the broken pieces then falling out through openings in the crushing grate.

More recently techniques have been developed whereby the temperature of the furnace can be accurately controlled and with certain applications it is desirable to control the temperature so that sintering of the individual preformed shapes fed into the furnace, takes place without a general melting and agglomeration of the whole feed.

The drawback inherent in extraction grates as heretofore used then becomes apparent in that the relatively loose material in the furnace runs right through without any control.

The invention consists of an arrangement for withdrawing solid material from a vertical furnace, comprising a crushing grate, an upwardly pointing conical member mounted below the crushing grate to receive the solid material and guide its flow outwardly and downwardly to an annular gap between the edge of the base of the conical member and the furnace walls and an annular shelf adjacent the furnace walls below said gap and extending radially inwardly beyond the edge of the base of the conical member to receive the solid material and guide its flow inwardly to fall through the central aperture of the annular shelf.

When the cone is stationary the static angle of repose of the material on the annular shelf is such that the material is prevented from running out but when the cone is oscillated or rotated, the angle of repose is reduced to the dynamic angle of repose and the material is discharged at a rate depending on the degree of agitation imparted to the solid material.

This effect can be increased by the addition of fork or plough members arranged for rotation around the vertical axis of the furnace and extending into the bed of material and operated from the grate drive or from an auxiliary driving arrangement.

The invention will be further described with reference to an embodiment shown in the accompanying drawing which is a section of the base of a vertical furnace having an extracting arrangement in accordance with the invention.

In the drawing the vertical furnace wall **1** is closed at the bottom by an annular plate **2** having a central orifice leading to an extraction shaft **3**.

Projecting through the base of the furnace is a driven vertical shaft **4** which drives at its top end within the furnace a crushing grate **5** which may be of known construction. Below grate **5** and attached thereto is mounted a conical shell **6** having plough members **7** secured at spaced intervals around the circumference of its base.

Between the plate **2** and conical shell **6** is an annular plate **8** extending radially inwardly beyond the edge of the base of the conical shell but leaving a circular aperture around the shaft **4**.

In operation, when shaft **4** is rotated or oscillated by suitable means (not shown) the solid material **9** in the furnace is crushed, should some agglomeration have occurred, and flows around and through the grate **5** into the space between the frusto-conical shell wall of **6** and the walls **1** of the furnace. It then flows around the outer edge of the member **6** onto the shelf formed by the plate **8** and then radially inwardly to the aperture in the centre of the plate and thence down into the extraction shaft **3**.

The ploughs **7** aid the movement of solid material. Narrow slots **6a** may be provided in the shell **6** to allow the passage of an air or other blast into the furnace.

The vertical distance from the edge of the base of the cone to the shelf **8** below it and the horizontal distance from the edge of the base of the cone to the inner edge **8'** of the plate **8** will be so arranged to provide the necessary discrimination between static and dynamic angle of repose for the solid material being extracted.

The angle of the cone is about 45° and should be such as to allow flow of solid material under all conditions.

Various modifications may be made within the scope of the invention.

I claim:

1. Arrangement for controlling the discharge of relatively loose solid material from the lower end of a vertical sintering furnace into an extraction shaft comprising in combination at the lower end of the furnace above said extraction shaft a rotatable crushing grate provided with openings of a size insufficient to retain the material on said grate, an upwardly pointed conical member rotatably mounted adjacent to and below said grate and adapted to receive the solid material passing through the said grate and to guide its flow outwardly and downwardly to an annular gap between the edge of the base of said conical member and the furnace walls, thereby intercepting a direct passage of the material from the grate into said extraction shaft, a stationary annular shelf provided with a central aperture and arranged adjacent the furnace walls below said gap and extending radially inwardly beyond the edge of the base of the conical member to receive the solid material passing through said gap and to guide its flow inwardly to fall through said central aperture into said extraction shaft, said annular shelf being of a radial width sufficient to retain the material received thereon in its static angle of repose, but insufficient to retain the same in its dynamic angle of repose, and means for rotating said conical member.

2. An arrangement as claimed in claim 1, provided with plough members arranged to extend into the bed of material received on the annular shelf, said plough members being rotatable around the vertical axis of the furnace.

3. An arrangement as claimed in claim 2, in which the plough members are mounted at spaced intervals around the circumference of the base of the conical member.

4. An arrangement as claimed in claim 1, in which narrow slots are provided in the conical member to allow the passage of air or other blast.

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