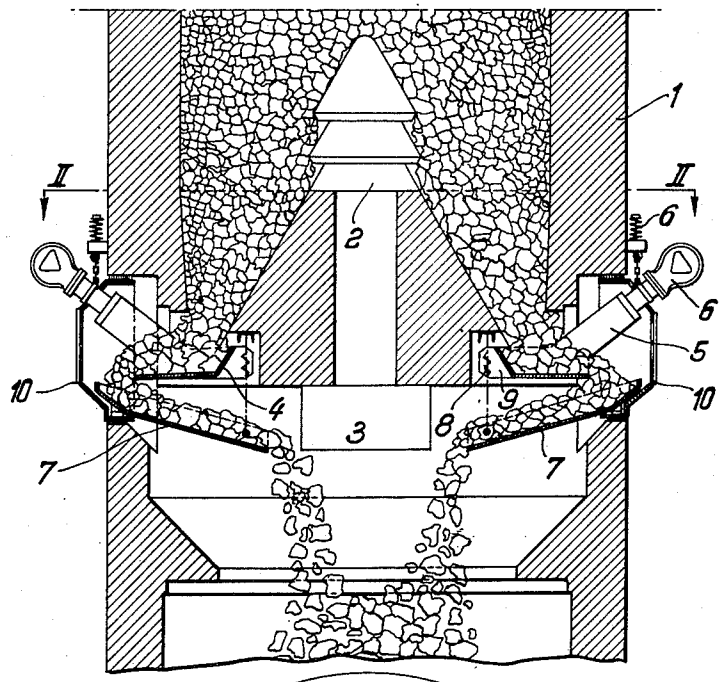
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DISCHARGE APPARATUS FOR OVENS SUCH AS LIMEKILNS AND THE LIKE

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Fig. 1



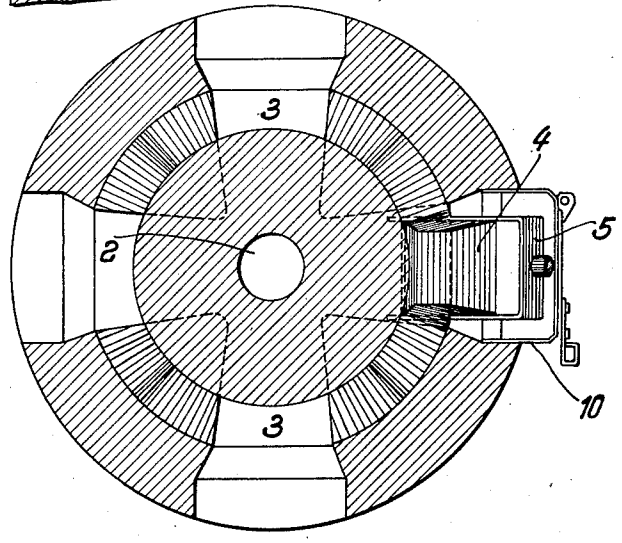


Fig. 2

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DISCHARGE APPARATUS FOR OVENS SUCH AS LIMEKILNS AND THE LIKE

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4 Claims. (Cl. 263—29)

The present invention relates to ovens, such as limekilns and the like.

More particularly, the present invention relates to a discharge apparatus for discharging materials from ovens of the above type. There are many different types of known devices for discharging materials from ovens of the above type, but all of these known devices have many movable parts of complicated construction which are quite delicate and which have a very involved operation, so that these known devices are quite expensive and at the same time unreliable in operation.

One of the objects of the present invention is to overcome the above drawbacks by providing a discharge apparatus which is of an exceedingly simple construction.

A further object of the present invention is to provide a discharge apparatus which is easily adjustable so that the rate of movement of material from the oven may be accurately and conveniently regulated.

Another object of the present invention is to provide a discharge apparatus which is capable of keeping all of the material in the oven in constant movement so that the material in the oven is treated in the most favorable manner.

An additional object of the present invention is to provide an oven of the above type with a single vibrating means which is capable of vibrating a plurality of pans located at different elevations.

Still another object of the present invention is to provide a discharge apparatus capable of being sealed so that no dust can escape from the apparatus.

A still further object of the present invention is to provide a discharge apparatus which avoids the necessity of reducing the size of the material being treated.

With the above objects in view, the present invention mainly consists of an oven, such as a limekiln or the like, this oven including an elongated hollow vertically extending shaft down which the material to be treated is adapted to move. A plurality of pans are located in the shaft adjacent the bottom thereof for receiving the material moving down the shaft and guiding the material away from the shaft, and a vibrating means is operatively connected to each of the pans for vibrating the same.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a sectional elevational fragmentary view of an oven constructed in accordance with the present invention; and

Fig. 2 is a sectional plan view taken along line II—II of Fig. 1 in the direction of the arrows, only one of the pans of Fig. 1 and its associated structure being shown in Fig. 2.

Referring now to the drawings, it will be seen that the oven of the invention includes an elongated hollow vertically extending shaft 1 down which the material to be treated is adapted to move. An air inlet means 2 is located within the shaft 1 adjacent the bottom thereof and is formed with suitable passages for admitting air into the interior of the oven, so that the desired treatment may take place. As is apparent from Fig. 1, the air inlet means 2 is provided with a vertically extending central passage coincident with the central axis of the oven and being covered by a series of inverted conical members arranged one above the other and being spaced from each other so that air may pass through the material being treated and at the same time this material will not obstruct the passages of the air inlet means 2. This air inlet means 2 is provided in its lower portion with a plurality of horizontally extending openings 3. Four such openings are shown in the drawings, although more or less than this number may be provided without in any way departing from the invention.

A plurality of pans 4, which are substantially trough-shaped, are respectively arranged in the openings 3 to receive the material moving down shaft 1 so as to guide this material away from the shaft 1, these pans 4 having receiving ends directed toward the central axis of the shaft 1 and having discharge ends located distant from this central axis. Each pan 4 is carried by an inclined substantially U-shaped member 5 which is fixed to each pan 4, as shown in the drawings, and a bar is fixed to the upper end of member 5, and extends upwardly away therefrom. A collar is fixed to each of these bars and is suspended from a chain fixed to the exterior of shaft 1, as is evident from the drawings. A pair of side pieces 9 are fixed to and extend inwardly from each pan 4 and a spring extends between these side pieces 9, this spring being connected to a rod 8 which is pivotally suspended at its top end from the air inlet means 2. Thus, by adjusting the location of the collar on the bar extending upwardly from member 5. it is possible to adjust the inclination of the bottom wall of each pan 4 so that this bottom wall is horizontal or slightly inclined to a horizontal plane, if desired.

At the outer end of each of the bars extending from the members 5 there is mounted a vibrating device 6 which may be in the form of a motor carrying an unbalanced weight so that during rotation of this motor vibrations are imparted to each pan 4, and the speed of each motor is adjustable, as by including a variable resistor in the circuit to the motor of each vibration device 6, so that the speed of each motor may be regulated to regulate the vibrations of the pans 4. Once regulated, the vibrations provided by the devices 6 will be uniformly maintained. Thus, by regulating the vibration devices 6 and/or by regulating the inclination of the pans 4 it is possible to regulate the rate of movement of the material discharged along the pans 4, and, as was mentioned above, it is possible to adjust the apparatus so that all of the material within the shaft 1 is in constant movement.

Each of the openings 3 is aligned with an opening in the wall of shaft 1, and this opening is closed by a sealing means 10 through which the bar extending from member 5 extends. The portion of sealing means 10 through which this bar extends engages this bar so as to seal the openings 3 and pans 4 from the outer atmosphere, and at the same time this portion of sealing means 10 is relatively thin so that it does not limit the freedom of movement of member 5 and pan 4. If desired, any suitable sealing ring may be arranged on the sealing means 10 about the bar extending from member 5 in sliding engagement there-

with, and also this sealing ring may be yieldable so that the pan 4 and member 5 have almost complete freedom of movement while at the same time being sealed from the outer atmosphere. Each sealing means 10 is provided with an opening through which access may be had to the opening 3, this opening being removably covered in any suitable way as by the slide member shown in Fig. 2, and also each sealing means 10 is provided with an opening which is covered with a transparent material so that the interior of openings 3 may be visually inspected at any time.

The bottom end of each rod 8 is pivotally connected to an additional pan 7 arranged beneath each pan 4 and being connected to a U-shaped member which rests on the bottom wall of sealing member 10 so that the pans 7 are free to vibrate and slide inwardly and outwardly. It will be seen that the vibrations imparted to each pan 4 will be transmitted by the elements 8 and 9 to the pan 7 so that only one vibration means 6 is required to vibrate each pair of interconnected pans 4 and 7.

As is apparent from the drawings, the pans 7 have their upper receiving ends respectively arranged beneath the discharge ends of the pans 4 and located distant from the central axis of shaft 1, while the discharge ends of the pans 7 are directed toward the central axis of the shaft 1 and are closer thereto than the receiving ends of the pans 7. The pans 4 serve to substantially close the bottom end of the shaft 1 and to direct the material being treated laterally and outwardly away from the shaft 1, the material then being received by the pans 7 and being guided thereby in the reverse direction laterally and inwardly toward the central axis of shaft 1. The material being treated simply falls from the discharge ends of pans 7 into any suitable bin or the like.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of ovens such as limekilns and the like differing from the types described above.

While the invention has been illustrated and described as embodied in discharge apparatus for ovens such as limekilns and the like, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In an oven, such as a limekiln or the like, in combination, an elongated hollow vertically extending shaft down which the material to be treated is adapted to move; air inlet means arranged in said shaft adjacent the bottom thereof and being formed with a plurality of substantially horizontal openings extending away from the central axis of said sahft; a plurality of pans respectively located in said openings for receiving material moving down said shaft and guiding said material away from said shaft; and vibrating means operatively connected to each of said pans for vibrating the same.

2. In an oven, such as a limekiln or the like, in combination, an elongated hollow vertically extending shaft down which the material to be treated is adapted to move; air inlet means arranged in said shaft adjacent the bottom thereof and being formed with a plurality of substantially horizontal openings extending away from the central axis of said shaft; a plurality of pans respectively located in said openings for receiving material moving down said shaft and guiding said material away from said shaft; a plurality of sealing means mounted on said shaft respectively over said openings and pans for sealing said openings and pans from the outer atmosphere; and a plurality of vibrating means located at the exterior of said sealing means and being operatively connected respectively to said pans for vibrating the same.

3. In an oven, such as a limekiln or the like, in combination, an elongated hollow vertically extending shaft down which the material to be treated is adapted to move; air inlet means arranged in said shaft adjacent the bottom thereof and being formed with a plurality of substantially horizontal openings extending away from the central axis of said shafts; a plurality of pans respectively located in said openings for receiving material moving down said shaft and guiding said material away from said shaft; sealing means mounted on said shaft over each of said openings and pans for sealing said openings and pans from the outer atmosphere; vibrating means located at the exterior of said sealing means and being operatively connected to each of said pans for vibrating the same; and a plurality of additional pans respectively connected to said first-mentioned pans to receive material therefrom, the vibrations of said first-mentioned pans being transmitted to said additional pans.

4. In an oven as defined in claim 3, said first-mentioned pans each having a receiving end directed toward the central axis of said shaft and a discharge end located distant from said central axis, and said additional pans respectively having receiving ends located beneath said discharge ends of said first-mentioned pans, and said additional pans each having a discharge end directed toward said central axis and located closer thereto than the receiving end of each additional pan.

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