

March 7, 1967

HANS-WERNER ZIEGLER ETAL

3,307,679

FEED DEVICE FOR TRAVELLING GRATES

Filed June 25, 1965

3 Sheets-Sheet 1

FIG. 1

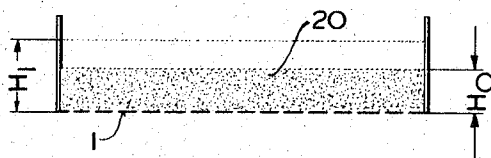


FIG. 2

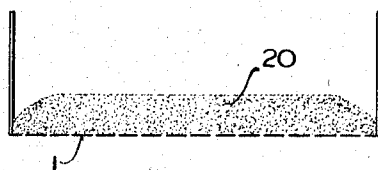
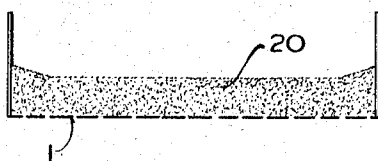


FIG. 3



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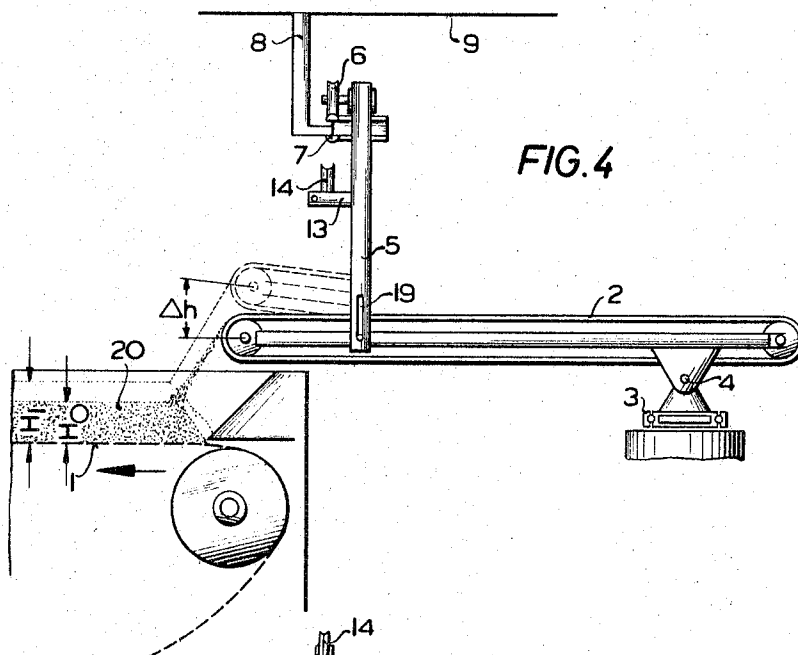


FIG. 4

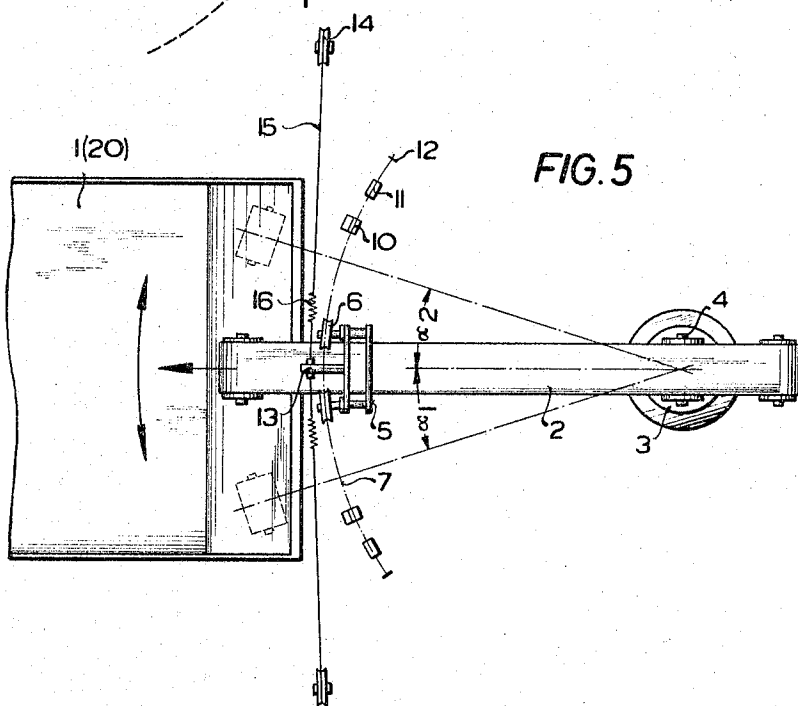


FIG. 5

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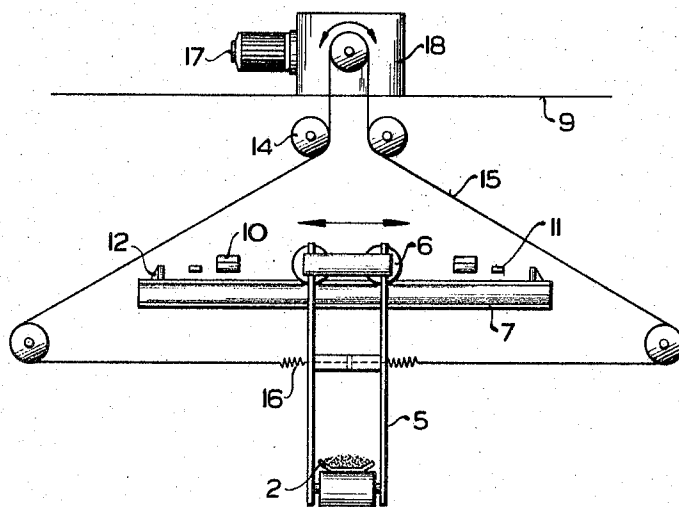
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FIG. 6



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FEED DEVICE FOR TRAVELLING GRATES

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Claims priority, application Germany, June 27, 1964,

K 53,336

5 Claims. (Cl. 198—112)

This invention relates to a feed device for travelling grates, sinter belts and the like which enables the height of a bed of material fed thereto to be adjusted. More particularly the invention concerns such feed devices of the type comprising a feeder belt adapted to be driven at a substantially uniform speed and to be oscillated from side to side at a variable angular velocity to vary the height of the bed of material desired to be placed on the grate.

A bed of material conveyed on a travelling grate, sinter belt and the like has a tendency to slip sideways with the result that the bed slopes laterally, the degree of lateral sloping depending on the bed height of the material.

Heating or other treating gases supplied to the bed of material tend predominantly to flow through the lateral portions of the bed of material. This results not only in heavy thermal stress to the lateral portions of the travelling grate but also in incomplete treatment e.g. heating or calcination of the material at the centre of the bed.

This occurrence can be suppressed by modifying the profile of the bed of material, i.e. by increasing the height of the bed near the side portions of the travelling grate.

A pre-selected profile for the bed of material can be obtained by means of a scraper plate provided with appropriately shaped cut-outs. However, using such a scraper plate necessitates initially supplying more material to the side portions than to the centre portion of a grate, and the material must be able to withstand to some extent pressure applied thereto. Materials of low pressure resistance, e.g. briquetted materials and uncalcined granular particles, become smashed under the action of the scraper or are at least subject to deformation or degradation. It is therefore expedient to feed the material so as to form a bed approximating to the profile desired to be obtained. The action of the scraper plate, which may be designed, for example, as a deflector or ratchet, should be limited to successive minor levelling of the bed of material, especially in the centre portion thereof. An example of such a scraper is shown in FIGURE 2 of British Patent No. 913,796.

Feed devices are known which employ a periodically oscillating and uniformly charged conveyor belt to permit of substantially even distribution of material on a sinter belt. However, as the angular velocity of the oscillatory motion of the conveyor belt has been unequal due to crank drives being usually employed, and due to the direction of motion being reversed at the two dead points, it has been necessary to use special means for varying the periodic oscillatory motion to achieve the desired distribution of material across the whole width of the travelling grate. To this end, it has been proposed to use a variable gear unit provided with elliptical gear wheels or a driving rod designed to automatically change its length during operation. As described in British Patent No. 885,633, a variable gear unit permitting the reducing gear ratio to be periodically varied is interposed between a drive motor running uniformly in one direction and an associated crank shaft.

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The present invention now provides a feed device for travelling grates and the like which enables a bed of material placed thereon to be adjusted in height, comprising a periodically reciprocating, uniformly charged conveyor feed belt which is (a) designed so as to feed material across the whole width of the travelling grate, (b) arranged to be pivotable around a vertical pivot pin adjacent its charge end, and (c) provided with rollers running on an arcuate rail which provides support for the conveyor feed belt near its discharge end, means being provided which permits the angular velocity of the periodic oscillatory motion of the conveyor feed belt to be varied.

The present invention provides more especially a conveyor feed belt having operatively coupled thereto, towards its discharge end, the two ends of a cable or the like which is caused by reversible drive means alternately to change its direction of motion so as to oscillate the conveyor feed belt. Electric limit switches, arranged at predetermined positions, and actuated by the impact of the conveyor feed belt upon contact of the conveyor therewith, limit the oscillatory motion. The limit switches are connected to time relays so as to enable the dwelling time of the conveyor belt at the extreme of its travel to be varied.

The reversible drive means comprises an electric drive motor adapted to run at a substantially uniform speed in one direction, and a reversing gear unit electromagnetically coupled thereto.

A feed device in accordance with the present invention is shown diagrammatically in the accompanying drawings, wherein:

FIGURE 1 is a cross-sectional view of a travelling grate charged with a uniformly high bed of material;

FIGURE 2 is a cross-sectional view of a travelling grate indicating the manner in which a bed of material thereon tends to slip sideways;

FIGURE 3 is a cross-sectional view of a travelling grate with a bed of material increased in height near the lateral portions of the grate;

FIGURE 4 is a side elevational view of the feed device;

FIGURE 5 is a plan view of the feed device; and FIGURE 6 is a rear view of the feed device seen in the direction of motion of the conveyor feed belt and travelling grate.

Referring to the drawings an endless belt conveyor 2 is arranged to be oscillated between positions indicated at α_1 and α_2 in a pivot bearing 3 about a vertical axis. The conveyor is also arranged to be variably inclined with respect to the horizontal, by pivoting about a horizontal pivot axis 4, to vary the height of the discharge end of the conveyor belt above a travelling grate 1. The degree of adjustment provided is indicated at Δh in FIGURE 4. The conveyor 2 is secured towards its discharge end in a slot 19 in a frame 5 so as to enable the conveyor to be set at a selected angle of inclination with respect to the horizontal. This angle of inclination is adjusted whenever it is desired to vary the height of material 20 placed on the travelling grate 1. In FIGURE 4, for example, the conveyor 2 when in the position indicated by the solid line results in a bed of a height H_0 being provided on the grate 1, and when in the position indicated by the dotted line results in a bed of a height H_1 being provided.

The frame 5 has a pair of rollers 6 mounted in tandem arrangement thereon to run on arcuate rail 7 which lies on a circle whose centre is the vertical axis of the pivot bearing 3.

The rail 7 is secured by means of one or more hangers 8 to a stationary constructional element 9.

The conveyor 2 is oscillated or swung from side to side about the bearing 3 by means of a cable 15 guided by cable rollers 14, the two ends of the cable being secured by means of damping springs 16 to an arm 13 of the frame 5. An electric motor 17, which in use is run at a substantially uniform speed, in one direction, and is electromagnetically coupled to a reversing gear unit 18, drives the cable 15 causing it to perform a periodically reciprocating motion carrying the conveyor 2 with it.

The rail 7 has limit switches 10 associated with it, the switches being electrically connected to time relays. (Not shown.) The switches 10 are disposed at preselected points of reversal for the oscillatory motion, and are arranged to be operated when contacted by the conveyor. When a limit switch is operated, the electromagnetic coupling for one direction of motion—formerly in engaged position—is switched off, and the oscillatory motion interrupted. At the same time, its associated time relay is actuated, which, after a pre-selected period, actuates the electromagnetic coupling for the reverse direction of motion. This operation is continuously repeated.

Any breakdown is controlled by special overrunning switches 11 arranged after the limit switches 10 in the direction of the oscillatory motion. On being contacted by the conveyor 2, they switch off the drive motor 17 and simultaneously operate an alarm. The rail 7 also has mechanical stops 12 still further to improve the safety of operation.

The feed device of the present invention enables material uniformly fed by the conveyor feed belt, for example, crude phosphate shapes prepared on a granulating plate, to be distributed across the travelling grate 1 in such a manner that the bed of material formed thereon, is higher adjacent the points of reversal of the oscillatory motion of the conveyor than elsewhere. These points are of course determined by the positions of the limit switches 10, and the time during which the conveyor is allowed to dwell at those points and thus the amount of material supplied to the adjacent regions of the grate, is determined by the setting of the time relays.

The dwelling time can be varied within wide limits. More especially, it may vary between 3 and 10 seconds as e.g. in a plant operated by applicants. In this plant, it has proved expedient to use mercury switches as the limit switches because their susceptibility to disturbances and dust is limited.

The number of limit switches associated with the rail 7, is not limited to two, and more limit switches with time relays can be provided if desired which then permits a bed of material of any required profile to be obtained.

We claim:

1. A feeding device for a travelling grate which enables the profile of a bed of material supplied upon said grate to be controlled, said feeding device comprising a conveyor, said conveyor being mounted upon a pivot having a vertical axis disposed adjacent the charging end of said conveyor, the discharge end of said conveyor being oscillatable above said travelling grate, limit means cooperating with said conveyor for adjusting the oscillation of said discharge end of said conveyor across the entire width of said travelling grate, an arcuate guide rail disposed adjacent the discharge end of said conveyor, bracket means connected to support said conveyor, said bracket means including roller means engaging said arcuate guide rail for carrying said discharge end of said conveyor in an arcuate path, drive means attached to said discharge end of said conveyor for oscillating it back and forth upon said arcuate guide rail, said drive means includes a motor, motion transmitting means connecting said motor to said discharge end of said conveyor, said limit means including limit switches being connected to said motion transmitting means, and time delay relays being connected to said limit switches to permit the dwelling time of the discharge end of said conveyor at its extremes of travel to be adjusted whereby the profile of said bed of material at said sides is adjusted relative to said profile at said center of said travelling grate.

2. A feeding device as set forth in claim 1 wherein said motor is a uniformly and unidirectionally running motor, said motion transmitting means is reversible and comprises a pulley and cable linkage from said drive motor to said discharge end of said conveyor means.

3. A feeding device as set forth in claim 2 wherein said pulley and cable linkage is connected to said bracket means.

4. A feeding device as set forth in claim 3 wherein said limit switches are disposed in the path of movement of said roller means.

5. A device as claimed in claim 1, wherein the reversible drive motor comprises an electric drive motor adapted to run in one direction at a substantially uniform speed and a reversing gear unit electromagnetically coupled thereto.

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EDWARD A. SROKA, *Assistant Examiner*.