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DEVICE FOR LAYERING STORAGE CONTAINERS WITH LOOSE MATERIAL

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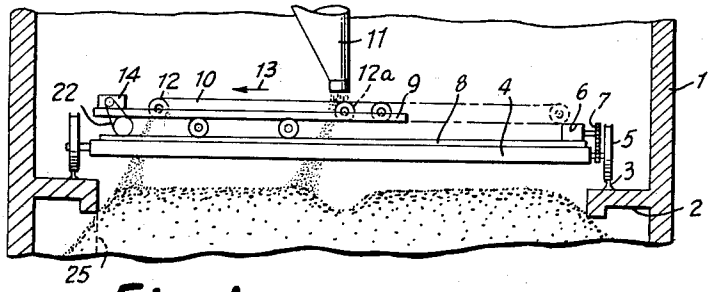


Fig. 1

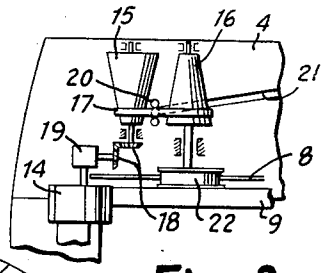


Fig. 3

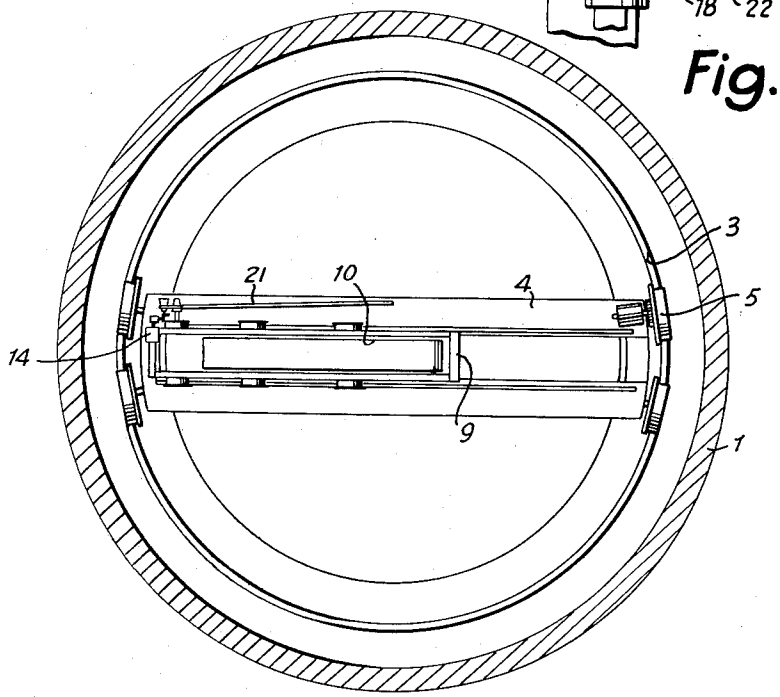


Fig. 2

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DEVICE FOR LAYERING STORAGE CONTAINERS WITH LOOSE MATERIAL

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2 Claims. (Cl. 214—17)

The invention relates to a device for layering storage containers with loose material, in which the material is fed by a radially displaceable throw-off band rotatable round a vertical axis.

In certain cases, for example when storing coal intended for coking, it is necessary to bring the material into the storage container while avoiding de-mixing. It is therefore necessary to bring the loose material into the storage container in uniform layers without the formation of a piled-up cone.

A method used for this purpose is to arrange above the storage container a radially displaceable throw-off band, rotatable round a vertical axis. With the known devices of this type the throw-off band, moved to and fro radially, runs with uniform velocity just like its rotating running frame. By this means however it is not possible to attain a uniform distribution of the loose material over the whole cross section of the storage container, as with increasing distance of the throw-off point of the throw-off band from the vertical axis of rotation of the rotating running frame for the storage container the path of the throw-off point in one rotation becomes ever greater, whereby the filling of the container decreases in proportion.

In order to attain a uniform distribution the velocity, either of the gear actuating the longitudinal displacement of the throw-off band or of the drive of the running frame which actuates the rotary movement must be decreased with increasing distance of the throw-off point from the vertical centre of the storage container. This reduction in velocity, as can easily be calculated, stands in inverse proportion to the distance of the throw-off point from the vertical centre of the storage container.

According to the invention it is therefore recommended to construct and arrange the drive, either for the longitudinal displacement or for the rotary movement of the throw-off band, in such a way that the velocity of one of the two drives or of both is automatically regulated in such a way that the product of radial velocity and longitudinal velocity of the throw-off point is constant over the whole path.

According to the invention the regulation of the velocity of one of the two drives can be carried out in such a way that on the running frame of the throw-off band, along the running track, there is arranged a curved cam track by which, by means of a lever bar, there results a corresponding adjustment of the drive, which is for example formed as a continuously variable gear or motor. The idea of the invention can also be carried out with other means. For example by means of switches arranged in the running path the velocity of one of the two driving motors can be reduced in stages with increasing distance of the throw-off point from the vertical container axis.

A further means for reducing the velocity of the drive may consist of the arrangement of time relays which, from the effect of switches arranged in the path of the throw-off band, actuate the switching out of the driving motor for a longer or shorter time.

Finally it is also an object of the invention to stop the longitudinal displacement of the throw-off band after reaching the edge of the ledge projecting in the interior of the storage container, while the throw-off band rotates further, by means of the end switch which reverses the current for change of direction and which is connected with a time relay, for so long that the space underneath the ledge is filled.

The diagrams show a preferred constructional form of the invention.

Fig. 1 is a partially sectioned longitudinal section through the upper part of a storage container with the layering device,

Fig. 2 is a plan according to Fig. 1,

Fig. 3 shows on a larger scale the drive of the layering device.

The storage container, marked **1**, has in its upper part a ledge **2** directed towards the inside, on which is carried the ring-shaped track **3**. On the ledge **2**, between the rail **3** and the wall of the storage container, there is a free space for inspection.

The storage container **1** can have a rectangular or round cross section. On the ring rail **3** a running frame **4** is carried rotatably on running wheels **5**. The running frame **4** is driven by a motor **6** which acts on one of the running wheels **5** through a transmission gear drive **7**. On the running frame **4**, on rails **8** of a running frame **9**, is carried a throw-off band **10**, which carries out to and fro movements by means of the running frame **9**. As is seen from Fig. 1, the material brought on to the band **10** by a filling tube carried in the vertical axis of the storage container is thrown off at **12** into the storage container, for which purpose the throw-off band **10** rotates continuously in the direction of the arrow **13**.

In Fig. 1 is shown the outer end position of the throw-off band **10**, from whence, by the action of an end switch, not shown in the diagram, the driving motor **14** of the running frame **9** is reversed so that the direction of running is now in the opposite direction. The inner end position of the throw-off band **10** is shown by dot-and-dash line at **12***a*. After reaching this inner end position there follows, again by means of an end switch, the reversal of the direction of running of the running frame **9**.

In order to regulate automatically the velocity, according to the invention, of either the drive of the running frame **9** or the drive of the running frame **4** for the rotary movement, to be inversely proportional to the distance of the throw-off point from the centre of rotation of frame **4** over the storage container, the driving motor **14** of the running frame **9** carrying the radially displaceable throw-off band **10** is provided with an infinitely variable drive **15**, **16**. This drive can be seen in detail diagrammatically from Fig. 3.

The infinitely variable drive **15**, **16** consists in its simplest form of two oppositely arranged conical shaped rollers over which a belt **17** runs. The driving roller **16** is connected with a running wheel **22** the axle of which again is connected with the running frame **9**, on one of the rails **8**. The driving roller **15** is connected through a bevel wheel drive **18** and a transmission gearing **19** with the motor **14**. The driving belt **17** is displaceable axially to the rollers **15**, **16** by means of a fork **20**. The fork **20** is guided in a longitudinal groove **21**; in place of it a rail can be provided as the cam track.

As is seen especially in Fig. 2, the groove **21** runs in a path which deviates from the direction of running of the running frame **9** in such a way that, in the outer end position (as shown) of the running frame **9** carrying the throw-off band, the driving belt **17** is in the position in which the running frame **9** has the lowest velocity. Cor-

respondingly the running frame **9** has its greatest speed in the innermost position, as shown by **12***a*. From this it follows that with increasing distance of the radially displaceable throw-off band **10** from the vertical axis of rotation of the frame **4** for the storage container, the running speed of the throw-off band **10** decreases. In consequence of the movement of the throw-off band **10**, which is thereby alternately retarded and accelerated, increasing with the distance of the throw-off point from the vertical axis of the container, the radial speed of the throw-off point is equalised, so that the loose material is uniformly distributed over the cross section of the storage container which is covered by the frame **4**.

When the throw-off band **10** has reached the outer end position shown in the figures, and the end switch, not shown, has brought about the reversal of the direction of rotation of the reversing motor **14**, at the same time a time relay—also not shown—is actuated, this being adjusted for the necessary time, up to the switching in again of the driving motor **14**, in order to fill the space lying below the ledge **2** in the uniform manner as explained. By these continued rotations of the rotating frame **4** with the driving motor **14** of the driving frame of the throw-off band **10** shut off, the result is attained that the material thrown off at the inner circumference of the ledge **2** lays against the wall of the storage container **1** in accordance with the piling angle, whereby the uniform distribution of the material over the whole cross section of the storage container is assured. Thus there results, from the throwing off of the material from the band **10**, a substantially horizontal surface of the material in the container **1**, broken merely by the piling up underneath the ledge **2**. Thereby any de-mixing of the material when it is brought into the storage container **1** is practically excluded.

It is also possible to form the edge **25** of the ledge as a sealing for the bunker, whereby also the edge **25** of the ledge forms the inner wall of the bunker so that there is no piling of the material.

I claim:

1. Apparatus for layering loose material comprising a reciprocating carriage mounted for reciprocation in a radial direction on a rotatable carriage, a conveyor mounted on said reciprocating carriage, means for rotating the rotatable carriage, and means for reciprocating the reciprocating carriage at a progressively varying rate, which is greater near the axis of rotation of the rotatable carriage and slower as the reciprocating carriage increases in distance from said axis of rotation, said last mentioned means comprising two oppositely arranged conical shaped rollers, a drive belt running over both said rollers, one of said rollers being connected to a running wheel of said reciprocating carriage to drive the same, and the other of said rollers being connected with a source of power to drive the same, a belt shifter for shifting the position of the drive belt axially of the conical rollers, and a cam guide for the belt shifter at an angle to the direction of running of the reciprocating carriage for operating the belt shifter in correspondence with the radial position of the reciprocating carriage relative to the axis of rotation of the rotatable carriage, said belt shifter and conical rollers and their drive belt being mounted for movement in unison with the reciprocating carriage, and the guide being stationary with respect thereto on the rotatable carriage.

2. Apparatus for layering loose material comprising a reciprocating carriage mounted for reciprocation in a radial direction on a rotatable carriage, a conveyor mounted on said reciprocating carriage, means for rotating the rotatable carriage, and means for reciprocating the reciprocating carriage at a progressively varying rate, which is greater near the axis of rotation of the rotatable carriage and slower as the reciprocating carriage increases in distance from said axis of rotation, said last mentioned means comprising two oppositely arranged conical shaped rollers, a drive belt running over both said rollers, one of said rollers being connected to said reciprocating carriage to drive the same, and the other of said rollers being connected with a source of power to drive the same, a belt shifter for shifting the position of the drive belt axially of the conical rollers, and a cam guide for the belt shifter at an angle to the direction of running of the reciprocating carriage for operating the belt shifter in correspondence with the radial position of the reciprocating carriage relative to the axis of rotation of the rotatable carriage, said belt shifter and conical rollers and their drive belt being mounted for movement in unison with the reciprocating carriage, and the guide being stationary with respect thereto on the rotatable carriage.

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