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ELEVATOR-COOLER APPARATUS FOR PULVERIZED MATERIALS SUCH AS FOUNDRY SANDS

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Fig. 1

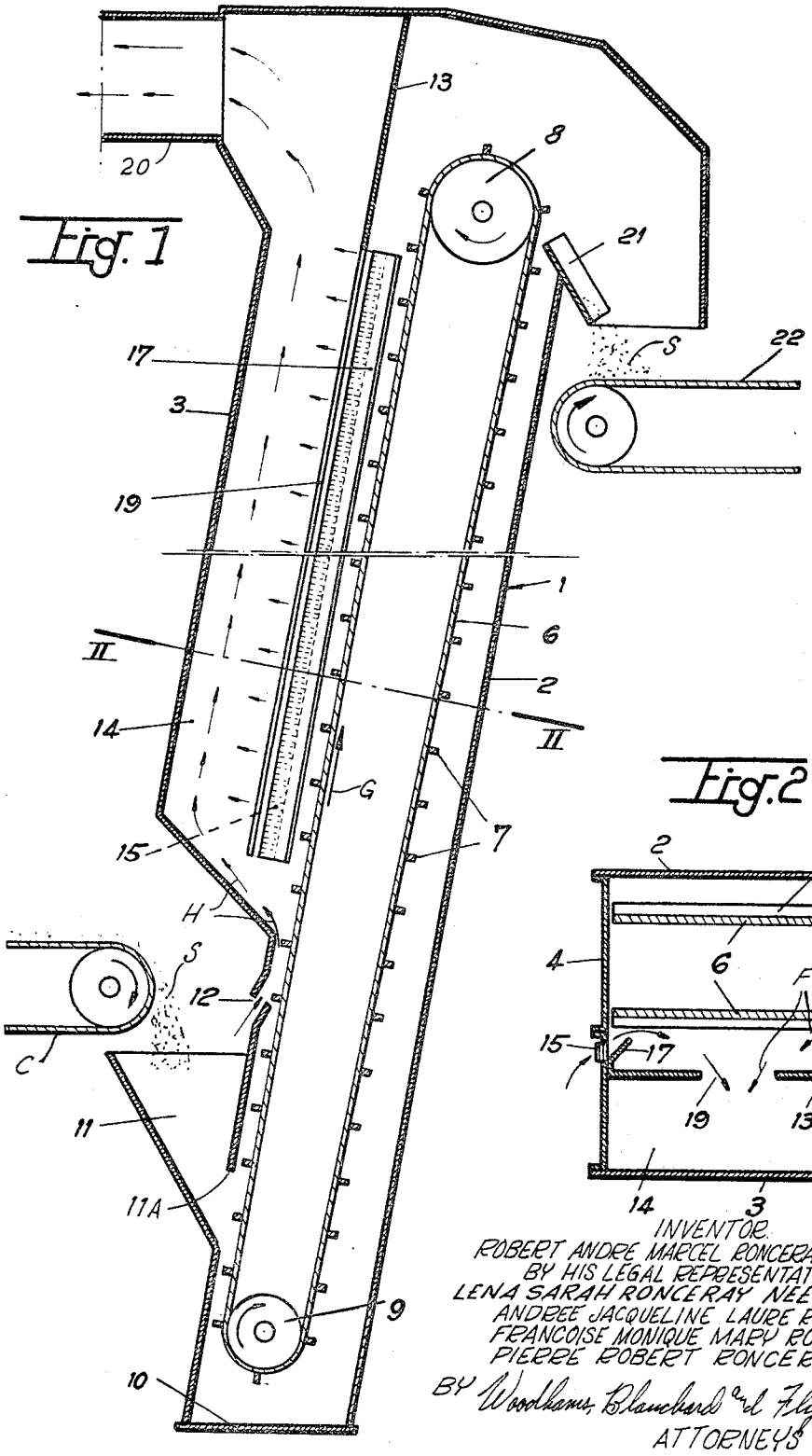


Fig. 2

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ELEVATOR-COOLER APPARATUS FOR PULVERIZED MATERIALS SUCH AS FOUNDRY SANDS

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Int. Cl. F26b 15/20

ABSTRACT OF THE DISCLOSURE

An elevator-cooler or evaporator is essentially a combination of an upright casing containing an endless conveyor belt having cleats and located in the casing so that said belt is longitudinally movable lengthwise of the casing. A passageway is provided in the casing parallel to the belt, and openings are located in the lateral walls of this casing so that they extend between the passageway and the part of the casing containing the belt. The casing side walls and the partition between the belt and the passageway are pierced by openings spaced regularly along its entire length. An air moving device is connected to the upper end of the passageway to draw air therethrough for cooling and dehumidifying the sand carried by the belt conveyor.

An apparatus is already known which provides as a single unit, a cooler and an elevator for foundry sand, such being used, for example, for its storage in silos. An apparatus of this nature is essentially and presently comprised of a substantially vertical casing in which is located a conveyor belt having cleats, with air being introduced at the lower part of this casing and exiting at the upper end. In these apparatuses, the cooling occurs through the evaporation of residual water contained in the sand, the water vapor which is produced being carried off by the air current.

This known apparatus, however, has an important disadvantage, namely, that the air rapidly reaches its saturation point in the lower portion of the casing so that in the middle or upper part of this apparatus, the evaporation and, consequently, the cooling is reduced considerably. In fact, some moisture may be redeposited in the upper part.

It has proven impossible to increase the cooling by increasing the quantity of air in circulation. Indeed, an increase of air not only increases the velocity of the air, but also the increased air current carries off a larger quantity of sand.

The present invention has as its principal objective the increasing of the evaporation of the water contained within the sand without noticeably increasing the speed of the cooling air current and, consequently, without increasing the quantity of sand being carried off by this air.

According to this invention, this objective is obtained by bringing fresh air in contact with the sand at all levels in this casing and by effecting the discharge of the humid air into and then through an adjacent passageway running the length of at least part of the casing.

The evaporator-elevator formed by the present invention is essentially the combination of a casing, an endless conveyor belt having cleats thereon and being arranged so that the reaches thereof move lengthwise of the casing. A passageway is provided within this casing parallel to the conveyor belt reaches, and openings are provided within the lateral surfaces of this casing and extend between the passageway and the part of the casing containing the belt. This passageway can be reached at close intervals along nearly all of its length through these openings.

Other advantages of this invention will appear from an examination of the following description and the following drawings, but the invention is not limited to these examples.

In the drawings:

FIGURE 1 is a central cross-sectional and partially schematic view of an elevator and cooler for sand embodying the invention.

FIGURE 2 is a sectional view taken on the line II—II of FIGURE 1.

In the embodiment represented in FIGURE 1, the apparatus forming the invention is comprised of a casing **1** having a rectangular cross section with a rear wall **2**, a front wall **3**, and two side walls **4** and **5**. In said casing is located an endless conveyor belt **6** which has cleats **7** secured to it at regular intervals lengthwise thereof. This belt travels around a pair of rotating drums **8** and **9** of which one, **8** for example, is a drum driven by a motor means (not shown).

Said casing **1** is closed at its lower end by a metal base plate **10**. Near this lower end of the casing and on its front wall is provided a hopper **11** into which the hot, wet sand S is dumped by conveyor C. The sand then flows into the casing **1** through an opening **11A** in said front wall **3**. Said front wall **3** is provided with a slit **12** through which a certain quantity of air can enter into the apparatus closely above the hopper **11**.

In the interior of casing **1** and parallel to belt **6** is located a partition wall **13** which defines the inner side of a passageway **14** adjacent the front wall **3** of the casing.

In the portions of the side walls **4** and **5**, located between the belt **6** and partition wall **13**, are arranged a certain number of openings, such as **15** and **16**, these openings being regularly placed along partition wall **13**. It is advantageous to provide two metal baffle plates **17** and **18** which serve respectively as deflectors for the air entering through openings **15** and **16** to direct said air toward belt **6**.

In the middle, and along nearly all of its length, the partition wall **13** is provided with a continuous slit **19** which may actually be a series of openings corresponding to openings **15** and **16**, through which the air can escape into passageway **14** as is shown by arrows F (FIGURE 2). The upper end of passageway **14** is connected by conduit **20** (FIGURE 1) to the intake of an exhaust device, such as a centrifugal fan (not shown). The sand S which is carried off by the current of air may be separated therefrom by a cyclone-type collector located between the conduit **20** and said fan.

The apparatus which has been described functions in the following manner:

The belt **6** operates in the direction of arrow G and the sand S, which has been introduced through hopper **11**, is carried by the cleats **7** toward the top of the casing **1** where it is dumped onto an inclined plane **21** which discharges the sand upon a conveyor **22** which carries it away.

As the sand is moved by the conveyor **6**, the ventilator is operated so that the fresh air is drawn into the casing through opening **12** and begins to agitate or flow around the moist and hot sand carried by the belt near said opening **12**. This air flows as shown by the arrows H through passageway **14**. At the same time, air is drawn into the passageway **14** through the series of openings **15** and **16**, hence through the sand being moved up-

wardly by the belt **6**, and joins the air flowing in passageway **14** in order to be carried off through conduit **20**.

Thus, in this manner, the sand is constantly in the presence of dry and fresh air and consequently cooled and dehumidified with a much greater speed.

The invention is not limited to the embodiment described but includes various modifications in detail which do not depart from the scope of the claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An evaporator-elevator for material, comprising:

an elongated upright casing;

conveyor means positioned within said casing for conveying material between vertically spaced receiving and discharge stations, said conveyor means including an endless member having material conveying means thereon with said endless member being movable substantially longitudinally of said casing;

partition means positioned within and extending longitudinally for at least a portion of the length of said casing, said partition means dividing said casing into two elongated chambers, said conveyor means being positioned within one of said chambers;

means providing openings in said portion of said casing in direct communication with said one chamber for permitting air to enter therein, said openings extending longitudinally of said casing over a substantial portion of the length of said one chamber so as to permit air to enter directly into said one chamber at a plurality of locations spaced along the path of movement of said conveyor means; and

opening means formed in said partition means and extending longitudinally therealong for permitting air to flow from said one chamber to said other chamber.

2. An evaporator-elevator as defined in claim **1**, further including deflectors positioned inside said casing adjacent said openings for directing the air toward said conveyor means.

3. An evaporator-elevator as defined in claim **1**, wherein said casing is provided with inlet and outlet openings adjacent opposite ends thereof for permtting material to be respectively received on and discharged from said conveyor means;

said casing further having an air inlet passage adjacent one end thereof and an outlet passage adjacent to the other end thereof, said air outlet opening into said other chamber;

said partition means extending substantially parallel to said endless member and having an end thereof positioned adjacent said other end of said casing, the opposite end of said partition means being positioned between said inlet and outlet passages; and

said openings extending longitudinally throughout the length of said casing in the region thereof containing both said conveyor means and said partition means.

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