United States Patent

[11] 3,592,453

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Bochum, Germany

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[54] SYSTEM FOR DRYING AND PREHEATING FINE-GRAINED MATERIAL, SUCH AS CEMENT RAW MATERIAL PARTICULARLY
4 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** 263/32R, 34/79, 34/236
[51] **Int. Cl.** **F27b 7/00**
[50] **Field of Search** ..... 263/32; 34/57, 57 A, 57 B, 57 C, 79

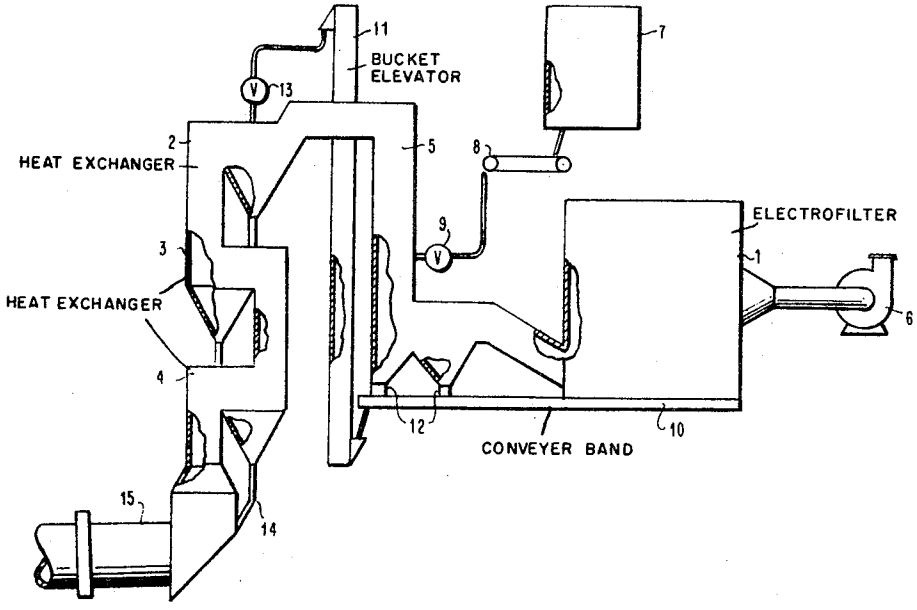
[56] **References Cited**
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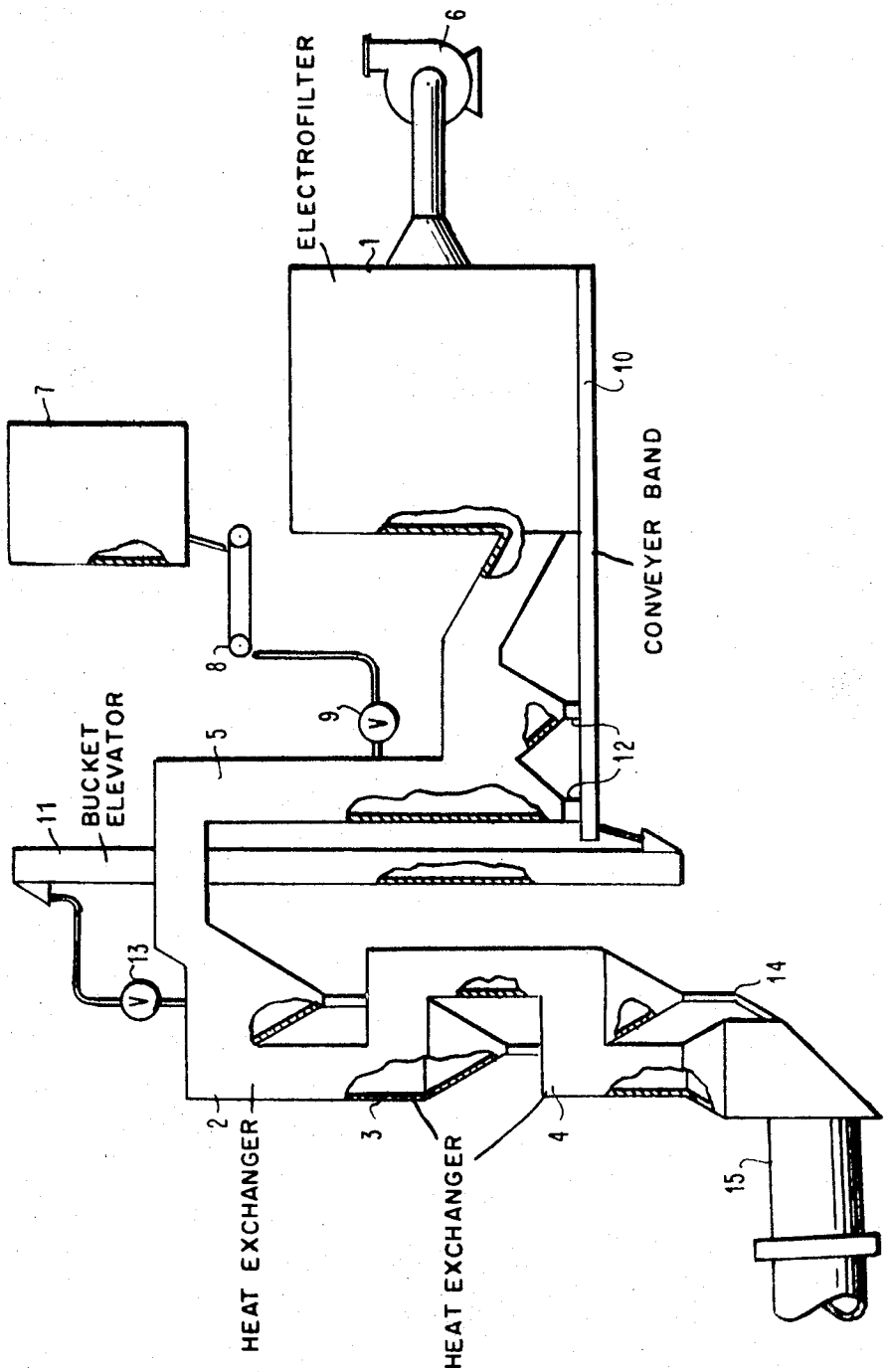
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Primary Examiner—Frederick L. Matteson
Assistant Examiner—Harry B. Ramey
Attorneys—Curt M. Avery, Arthur E. Wilfond, Herbert L. Lerner and Daniel J. Tick

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ABSTRACT: Device for drying and preheating fine-granular material includes an electrofilter, a hot gas supply duct connected to the electrofilter and formed with an advance precipitation chamber, means for supplying fine-granular material directly to the duct for precipitating a portion thereof in the chamber, bucket elevator means adjacent the chamber and the electrofilter for receiving precipitated material from both thereof and for transporting the precipitated material to a heat exchanger stage connected upstream of the duct.




ELECTROFILTER
6
1
7
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CONVEYER BAND
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V
5
BUCKET ELEVATOR
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13
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15
HEAT EXCHANGER
HEAT EXCHANGER

SYSTEM FOR DRYING AND PREHEATING FINE-GRAINED MATERIAL, SUCH AS CEMENT RAW MATERIAL PARTICULARLY

My invention relates to device for drying and preheating fine-granular material, especially cement raw material.

Known devices of this general type are made up of several serially connected heat exchanger stages, through which the hot gases, such as the waste gases of a rotary kiln, are drawn or aspirated sequentially. One or more cyclones, into the hot gas supply duct of which the pulverulent cement raw material is charged, are connected upstream of the first or upper heat exchanger stage for advance precipitation of the material upstream of the after-connected electrofilter. These cyclones have a large flow resistance and require considerable space.

It is furthermore known to connect an electrofilter directly upstream of a rotary kiln, the granular raw material being fed into the hot gas duct to the electrofilter, and the granular output of the electrofilter arriving in the rotary kiln. This construction has the disadvantage that the duration time of the material therein is too short for obtaining good heat exchange.

It is accordingly an object of my invention to provide device for drying and preheating fine-granular material which avoids the foregoing disadvantages of the heretofore known devices of this general type.

Further objects of my invention are to reduce the flow resistance and the energy requirement, accordingly, for drying devices formed of several heat exchanger stages and to assure simultaneously a longer dwell time of the material in the devices.

With the foregoing and other objects in view, I provide in accordance with my invention, device for drying and preheating fine-granular material which comprises an electrofilter, a hot gas supply duct connected to the electrofilter and formed with an advance precipitation chamber, means for supplying granular material directly to the hot gas supply duct for precipitating a portion thereof in the advance precipitation chamber, bucket elevator means adapted to receive both precipitated granular material from the advance precipitation chamber and granular output of the electrofilter for transporting the same to a heat exchanger stage connected upstream of said advance precipitation chamber whereby an additional circulation of the granular material between the hot gas supply duct to the electrofilter and the preceding heat exchanger stage is provided.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as device for drying and preheating fine-granular material, especially cement raw material, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description when read in connection with the accompanying single FIGURE, in which there is presented a schematic view of a device for drying and preheating fine-granular material according to my invention.

Referring now to the drawing there is shown a preheating

and drying device or system formed of several heat exchanger stages **2**, **3** and **4**, a hot gas supply duct **5** connected to the heat exchanger stage **2** and to an electrofilter **1** which also serves as a heat exchanger stage. A waste gas blower or fan **6** connected downstream of the electrofilter **1** draws hot gas from a rotary kiln **15** successively through the heat exchanger stages **4**, **3** and **2**, the hot gas supply duct **5** and the electrofilter **1**. Granular cement raw material is charged from a silo **7** by means of a conventional metering device **8** through a delivery lock **9** to the hot gas duct **5**. Granular material precipitated in the electrofilter **1** is transported by a conveying device **10**, such as an endless belt or chain conveyor, to a bucket elevator **11**. Similarly, granular material precipitated in the hot gas duct **5** in advance of the electrofilter **1** is fed to the conveying device **10** through outlet tubes **12** of a precipitation chamber located in the hot gas supply duct **5**. The bucket elevator **11** then feeds the material precipitated in the advance precipitation chamber of the hot gas supply duct **5** and in the electrofilter **1** through a delivery lock **13** to the heat exchanger stage **2** from which the precipitated material is delivered to the heat exchanger stage **3** and from the latter to the heat exchanger stage **4**. The precipitated material finally passes from the heat exchanger stage **4** through a supply tube **14** into the rotary kiln **15**. At least part of the fines of the particulate material delivered by the bucket elevator **11** into the heat exchanger stage **2** is recirculated by the suction of the blower **6** through the hot gas supply duct **5** and the electrofilter **1**.

I claim:

1. Device for drying and preheating fine-granular material comprises an electrofilter, a hot gas supply duct connected to said electrofilter and formed with an advance precipitation chamber, means for supplying fine-granular material directly to said hot gas supply duct for precipitating a portion of said material in said advance precipitation chamber, means for receiving precipitated material from both said advance precipitation chamber and said electrofilter and bucket elevator means cooperating with said material receiving means for transporting the material to a heat exchanger stage connected upstream of said hot gas supply duct.

2. Device according to claim **1**, wherein said heat exchanger stage is the first stage of a plurality of serially connected heat exchanger stages.

3. Device according to claim **1**, including a rotary kiln connected upstream of said heat exchanger stage, and a suction blower connected downstream of said electrofilter and adapted to draw hot gas from said rotary kiln through said heat exchanger stage, said hot gas supply duct and said electrofilter.

4. Device for drying and preheating fine-granular material comprising an electrofilter, a hot gas supply duct connected to said electrofilter and formed with an advance precipitation chamber, means for supplying fine-granular material directly to said hot gas supply duct for precipitating a portion of said material in said advance precipitation chamber, bucket elevator means adapted to receive precipitated material from both said advance precipitation chamber and said electrofilter for transporting the material to a heat exchanger stage connected upstream of said hot gas supply duct, including conveyor band means substantially intersecting with said bucket elevator means and located adjacent said advance precipitation chamber and said electrofilter for receiving the precipitated material therefrom and conveying the same to said bucket elevator.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,592,456 Dated July 13, 1971

Inventor(s) Louis F. Miklos

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Cancel the present sheet of drawing and insert sheet 1, containing figures 1 to 5.

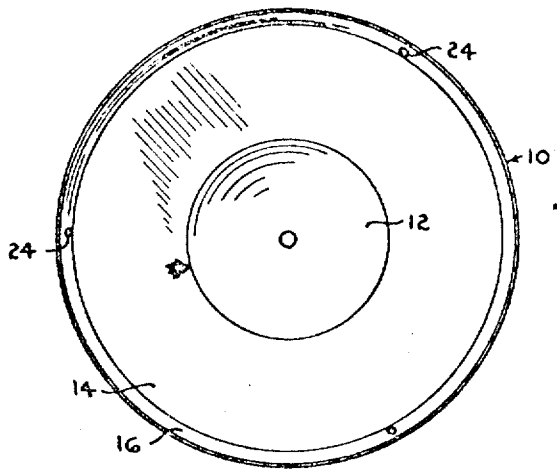


Fig.-1

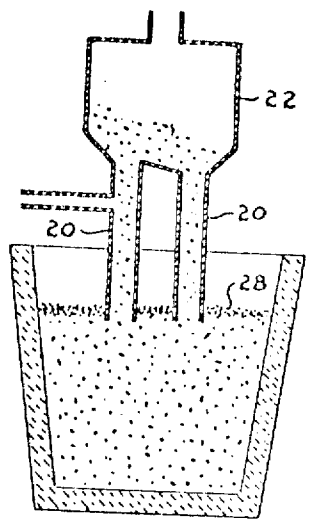


Fig.-3

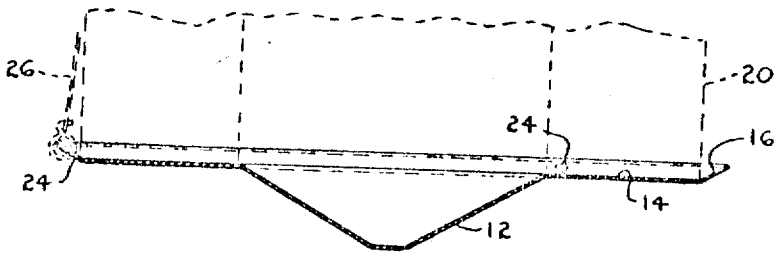


Fig.-2

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334

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CERTIFICATE OF CORRECTION

Patent No. 3,592,456 Dated July 13, 1971

Inventor(s) Louis F. Miklos PAGE - 2

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

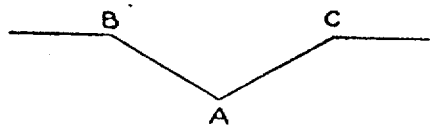


Fig. 4

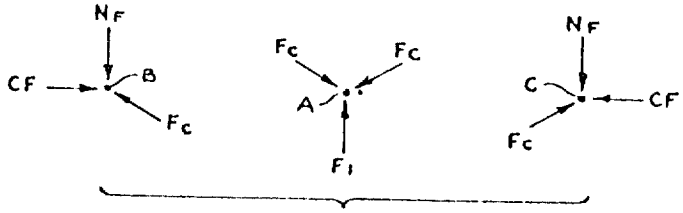


Fig. 5

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CERTIFICATE OF CORRECTION

Patent No. 3,592,456 Dated July 13, 1971

Inventor(s) Louis F. Miklos PAGE - 3

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the caption, that portion of the inventor's address reading " 6151 Delaware St., Lake County, Ind. 46409" should read -- 6151 Delaware St., Gary, Ind. 46409--.

Signed and sealed this 4th day of January 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334