

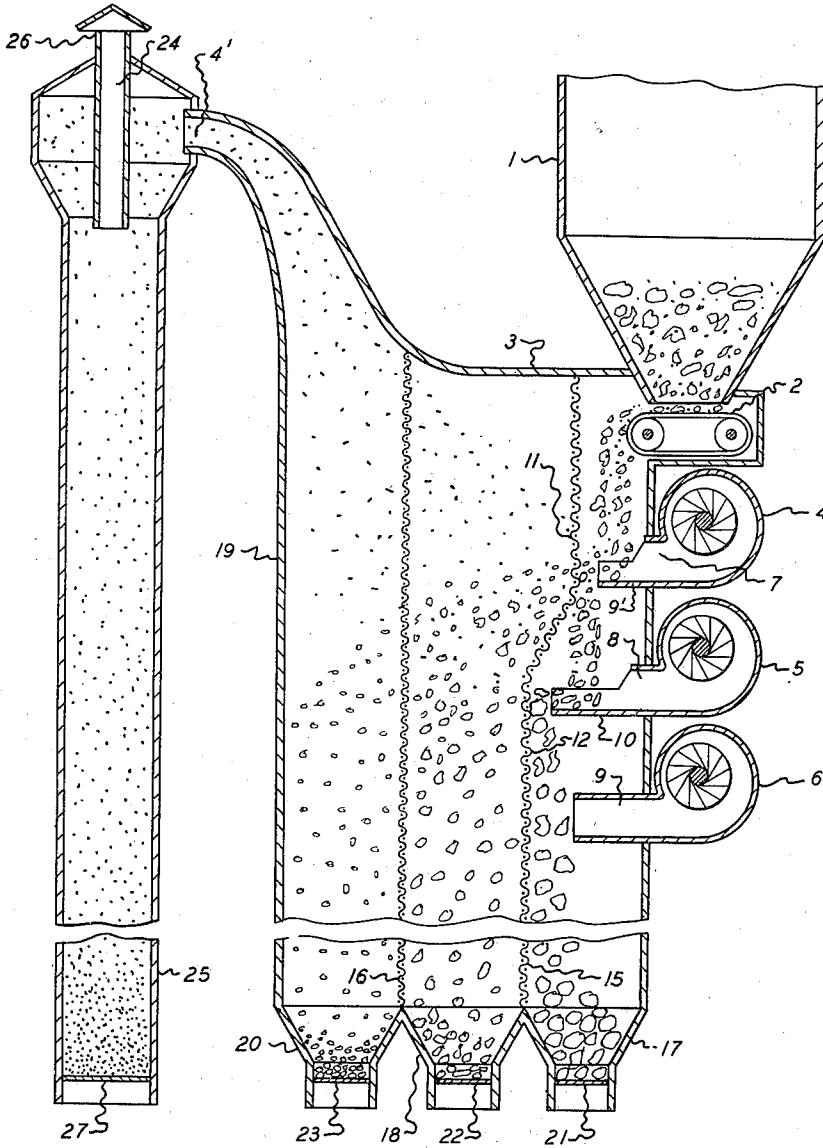
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J. A. ERICKSON

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MIXED MATERIAL SEPARATOR

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Inventor

JOHN A. ERICKSON

By *Beaman & Langford*
Attorneys

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MIXED MATERIAL SEPARATOR

John A. Erickson, Jackson, Mich.

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3 Claims. (Cl. 209—25)

The present invention relates to separators and more particularly to separators for separating particles of coal of different sizes from coal slack or fines.

In the separation of particles of coal from coal slack or fines, particular difficulty is encountered when the particles are between about $\frac{1}{8}$ " and $\frac{1}{4}$ " in diameter. The separation difficulty is materially increased when the coal is damp or wet, which it usually is if stored on a dock or in a storage yard. At the present time this separation is accomplished by means of washing the coal through screens. When this process is used, the cost of dewatering the coal is frequently substantial.

According to the present invention the separation of coal fines or slack of the character described has been accomplished by a combination of an air blast blowing the material to be separated against vertical screens in an airtight chamber arranged so that no air can leave the chamber except through an outlet which has associated with it a cyclone dust collector. The blowers for creating the air blast are vertically arranged and spaced, and a thin stream of coal is made to fall in front of the blowers so that it is blown laterally into engagement with the screens which effect the separation. A shelf in front of each blower breaks the fall of the material as it drops and helps to separate the particles thereof.

An object of the present invention is to separate material of mixed sizes into various sizes by presenting material into a thin falling stream in front of laterally directed blowers having associated therewith separators which are laterally spaced.

Another object of the invention is to provide an enclosed chamber having therein upwardly extending screen separators against which material to be separated is directed by blowing means.

Still another object of the invention is to provide a separator of the character described having a cyclone dust separator associated with the outlet therefrom.

A further object of the invention is to provide a separator of the character described wherein the material is cascaded over shelves associated with blowers.

These and other objects residing in the arrangement, combination and construction of the parts will be apparent from the following specification when taken with the drawing illustrating a diagrammatic vertical section of the inven-

tion having sections of the structure broken out to reduce the size of the drawing.

In the drawing the reference character 1 indicates a hopper for receiving the material of mixed sizes such as coal, slack or fines. The hopper is arranged to discharge the material therefrom onto an endless belt 2 driven by a motor or its equivalent, not shown. The outlet of the hopper 1 and belt 2 are arranged in an air-tight chamber 3 provided with an outlet 4'.

Associated with the chamber 3 are a plurality of blowers 4, 5 and 6. The blowers 4, 5 and 6 are vertically aligned and spaced, and have outlets 7, 8 and 9 respectively, directed into the chamber 3. Associated with the outlets 7 and 8 are shelves 9' and 10 respectively. The shelf 9' is arranged directly below the discharge from the conveyor belt 2 so that as the conveyor belt 2 is moved in a counterclockwise direction, as viewed in the drawing, the mixed material falls in a stream onto the shelf 9'. The blower 4 blows the mixed material from the shelf 9', blowing it laterally against a portion 11 of an upwardly extending screen 15. The part of the material which does not pass through the screen 15 falls to the shelf 10, which is staggered outwardly from beneath the discharge of the shelf 9', so as to receive material falling from the screen portion 11. The blower 5 in turn blows the material laterally from the shelf 10 against the screen portion 12 of the screen 15. It is to be noted that the screen portion 11 is disposed over the shelf 10 so that material blown from the shelf 9' and not passing through the screen portion 11 will be in position to fall onto the shelf 10.

Arranged within the chamber 3 is the upwardly extending screen 15 and a generally similar screen 16. The purpose of the screens 15 and 16 is to separate the material blown laterally by the blowers 4, 5 and 6. To accomplish the desired separating the screen 15, which is closest to the blowers 4, 5 and 6, is the coarsest, and the screen 16 is less coarse. It will be understood that additional screens might be employed if desired and that the coarseness of the screens varies inversely with the distance from the blowers 4, 5 and 6.

Arranged adjacent the bottom of the screen 15 is a collecting hopper 17, arranged adjacent the bottom of the screen 16 is a collecting hopper 18, and arranged adjacent the bottom of the space between the screen 16 and the wall 19 of the chamber 3 is a collecting hopper 20. The hoppers 17, 18 and 20 are provided with closure

members 21, 22 and 23, which may be actuated to permit the gravity flow of material in the respective hoppers therefrom.

The outlet 4 of the chamber 3 is arranged adjacent the top of the chamber 3, and has associated therewith a cyclone separator 24 which may be of any conventional form. The separator 24 has a collector 25 associated therewith into which dust falls upon being separated from the air escaping from the outlet 4'. Clean air escapes from the top 26 of the separator 24. A closure member 27 is provided in the collector 25 which may be opened to withdraw dust from the collector 25.

In operation the material from the hopper 1 is conducted by the conveyor 2 to the end thereof, from which it drops in a falling stream onto the shelf 9'. From there it is blown by the blower 4 against the screen portion 11. The part of the material which does not pass through the screen portion 11 drops onto the shelf 10. The material from the shelf 10 is blown by the blower 5 against a laterally offset screen portion 12. The laterally offset portion 12 of the screen 15 permits the shelf 10 to be under the screen portion 11 so as to receive material falling from the latter. The part of that portion of the material which does not pass through the screen portion 12 falls into the hopper 17. However, as the material falls from the screen portion 12, it is subjected to a stream of air from the blower 6 which removes from the material falling to the hopper 17, any particles small enough to pass through the screen 15. As the material drops on the shelves 9' and 10, particles thereof which have adhered together, due to moisture or some other reason, become separated, and the separating is further accomplished by the blast of air from the blowers 4 and 5 and by the impact of the blown material against the screens 15 and 16. After particles of material pass through the screen 15 the air blast from the blowers 4, 5 and 6 continues to move such particles laterally and against the screen 16. The screen separates out larger particles into the hopper 18 and permits the smaller particles to pass through to be received by the hopper 20 and collector 25.

In the foregoing specification, there are described three blowers, two shelves associated with the first two blowers, and two separating screens. It will be understood that the invention is not limited to any particular number of blowers or screens.

Having thus described my invention, what I desire to secure by Letters Patent and claim is:

1. A separator for materials containing large and small cohered particles comprising a blower for providing a laterally directed stream of air, a substantially horizontal shelf adjacent said blower and across which said blower directs its stream of air, means to drop a stream of material onto said shelf to subject the same to a material particle separating impact, and screening and impact means in the path of said air stream for separating and breaking up the cohered large and small material particles blown into relationship with the same.

2. A separator for materials containing large and small cohered particles comprising a blower for providing a laterally directed stream of air, a substantially horizontal shelf adjacent said blower and across which said blower directs its stream of air, means to drop a stream of material onto said shelf to subject the same to a material particle separating impact, a screen in the path of said air stream for separating material particles blown into relationship with the same, the finer particles passing through said screen and the larger particles dropping from said screen, a second shelf beneath said screen for receiving material particles dropping from said screen, a second blower associated with said second shelf for blowing a stream of air across said second shelf, and a second screen portion in the path of the air stream from said second blower for separating material particles blown into relationship with the same.

3. The invention as defined in claim 2 wherein said screens are close enough to their respective shelves to cause material particles blown thereagainst to receive a material particle separating impact.

JOHN A. ERICKSON.