

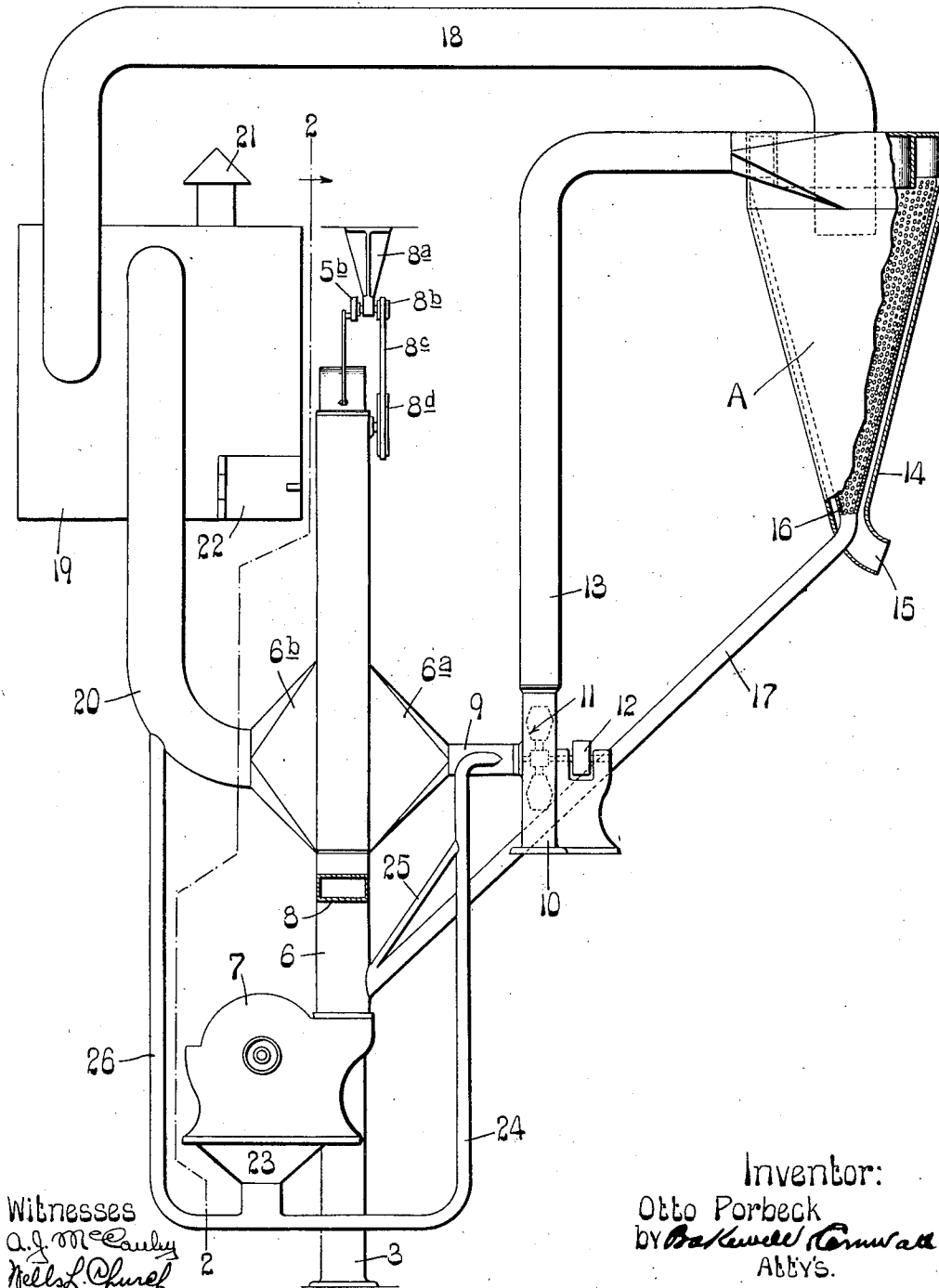
O. PORBECK.
GRINDING AND SEPARATING APPARATUS.
APPLICATION FILED JUNE 5, 1908.

946,864.

Patented Jan. 18, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



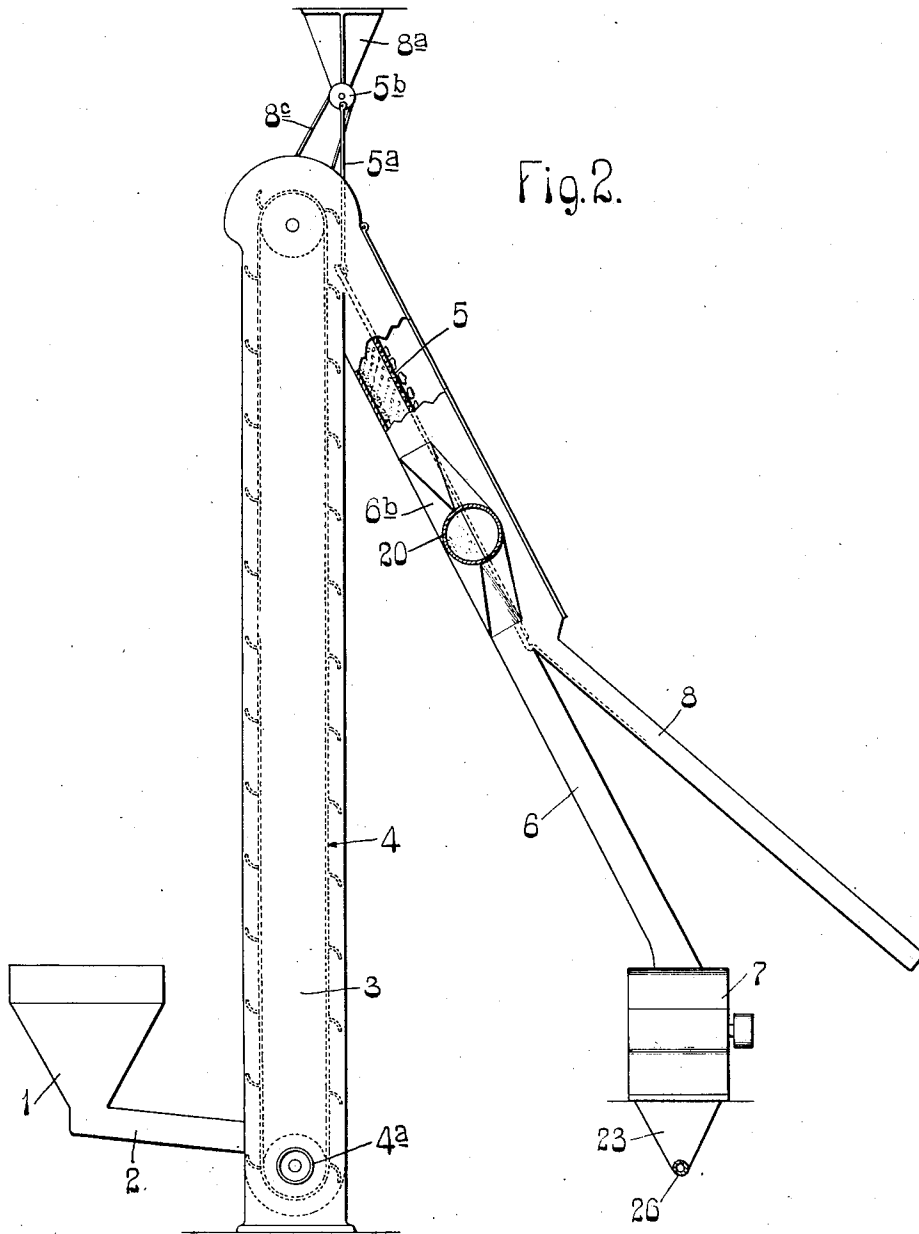
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UNITED STATES PATENT OFFICE.

OTTO PORBECK, OF ST. LOUIS, MISSOURI.

GRINDING AND SEPARATING APPARATUS.

946,864.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed June 5, 1908. Serial No. 436,885.

To all whom it may concern:

Be it known that I, OTTO PORBECK, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Grinding and Separating Apparatuses, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevational view of an apparatus constructed in accordance with my invention; Fig. 2 is a vertical sectional view taken on approximately the line 2—2 of Fig. 1.

This invention relates to apparatuses that are used for grinding, pulverizing or shredding materials and also collecting the particles of dust produced in the operation of grinding the material.

The main object of my invention is to provide an apparatus that comprises a grinding, pulverizing or shredding machine, a separator, means for causing the material that passes through said machine to enter the separator, means for conveying the material which is too coarse to pass through the screening member of the separator back to the grinding machine so that it will be re-ground, and means for collecting the dust in the dust-laden air that leaves the separator.

Referring to the drawings which illustrate the preferred form of my invention, 1 designates a hopper into which the material to be operated on is dumped, and 2 designates a discharge spout that establishes communication between said hopper and a vertically disposed casing 3 in which an endless conveyer 4 is arranged, said conveyer being adapted to carry the material from the spout 2 and discharge it onto an inclined vibrating plate 5 located adjacent the upper end of the casing 3. Said vibrating plate is provided with perforations or holes through which some of the material passes into a feed conduit 6 that communicates with the mouth or feed opening of a pulverizing, grinding or shredding machine 7, the particles of material which are too large to pass through the openings in the plate 5 sliding down said plate to a discharge chute 8 ar-

55 ranged adjacent the lower end of the plate. The lower end of the plate 5 is hinged or pivotally connected to a stationary member and the upper end of said plate is connected by a link 5^a to a pin on a disk 5^b secured to a shaft that is mounted in a stationary bearing 8^a, said shaft being provided with a pulley 8^b that receives a belt 8^c which passes over a pulley 8^d secured to the upper shaft of the endless conveyer 4, the lower shaft of said conveyer being provided with a pulley 4^a that receives a belt, not shown. 60 65

The feed conduit 6 which conducts the material to the grinding machine 7 is provided intermediate its ends with flared portions 6^a and 6^b that cause the material to spread out while it is traveling to the grinding machine. A branch pipe 9 connects the flared portion 6^a of the conduit 6 with a casing 10 in which a fan 11 is arranged, as shown in dotted lines in Fig. 1, the shaft of said fan being provided with a pulley 12 that is adapted to be driven by a belt, not shown. 75

A conduit 13 leads from the discharge end of the fan casing 10 to a separator A of any preferred type, the separator herein shown consisting of an approximately inverted conical-shaped casing 14 closed at its upper end, and provided at its lower end with a discharge opening 15. A screen or screening member 16 is arranged inside of the casing 14, and the contracted lower end of said screen is arranged in alinement with an inclined pipe 17 that is tapped into the feed conduit 6 at a point adjacent the mouth of the machine 7. 80 85 90

A conduit 18, which enters the closed upper end of the casing 14 of the separator, leads to a dust-settling chamber 19, said chamber being connected to the flared portion 6^b of the feed conduit 6 by means of a pipe or conduit 20. As shown in Fig. 1, said dust-settling chamber is provided with a ventilator 21 and a door 22 that can be opened so as to enable the dust to be removed from said chamber. A hopper 23 is located adjacent the discharge opening of the grinding machine 7 so as to receive the material that passes through said machine, and a pipe 24 connects said hopper with the short branch pipe 9 that enters the fan casing 10 so that the ground material which passes from the machine 7 into the hopper 23 will 105

be drawn up through the pipe 24 and then forced into the conduit 13 that leads to the separator. If desired, a short pipe 25 can be tapped into the pipe 24 adjacent the upper end thereof and into the pipe 17 adjacent the lower end thereof, as shown in Fig. 1. I also prefer to connect the lower end of the pipe 24 with the conduit 20 that leads from the dust-settling chamber by means of a pipe 26.

Having described the construction of my improved apparatus, I will now describe the operation of same. The material to be operated on is dumped into the hopper 1 and passes out of the discharge pipe 2 of said hopper to the endless conveyer 4 which carries it up to the vibrating plate 5. Said plate 5 is vibrated constantly by the mechanism previously described so that the particles of material which are small enough to pass through the openings in said plate will enter the feed conduit 6 and slide down said conduit to the grinding machine 7, the particles of material that are too large to pass through the openings in the plate 5 sliding down said plate to the discharge chute 8 at the lower end thereof. The material that slides down the feed conduit 6 will spread out when it reaches the flared portions of said conduit, and the fine particles of said material will be drawn into the fan casing by the suction which the fan 11 creates, said fine particles being then forced through the conduit 13 into the separator A. The material that enters the machine 7 will be ground, pulverized or shredded, depending, of course, upon the type of machine that is used, and said ground material is then drawn away from said machine by the suction in the pipe 24. The fan 11 draws said material up through the pipe 24 and forces it through the conduit 13 into the separator A so that the fine particles of material will pass through the screen 16 and thus slide down the casing 14 to the discharge opening at the lower end thereof, the particles of material which are too coarse to pass through the screen 16 being conducted back to the machine 7 by the inclined pipe 17. The current of air which carries the material into the separator becomes laden with dust and passes from the separator into the pipe or conduit 18 and thence into the dust-settling chamber 19. The heavy particles of dust settle or collect in this chamber 19 and the lighter particles of dust pass with the current of air through the pipe 20 back into the separator.

With an apparatus of this construction every particle of the material is saved, for the grinding machine, separator and dust-settling chamber form parts of a continuous conduit in which a current of air is constantly passing.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent is:

1. An apparatus of the character described, comprising a grinding, shredding or pulverizing machine, a separator provided with a screening member, a fan for drawing the material from said grinding machine and forcing it into the separator, a dust-settling chamber for receiving the dust-laden air that leaves the separator, a direct connection between the dust-settling chamber and the casing of said fan so that said fan will suck the air out of said dust-settling chamber, and means for conducting the material that is too coarse to pass through the screening member of the separator back to the grinding machine.

2. An apparatus of the character described, comprising a grinding, shredding or pulverizing machine, a feed conduit for conducting the material to be ground to said machine, a separator, a fan for drawing the ground material out of said machine and forcing it into the separator, and a connection between an intermediate portion of said feed conduit and the suction end of said fan for causing the fine particles of material which pass through said feed conduit to enter the fan and thus be forced into the separator without passing through the grinding machine.

3. An apparatus of the character described, comprising a grinding, shredding or pulverizing machine, a feed conduit for conducting material to said machine, said conduit being provided intermediate its ends with an enlarged portion, a separator, and a fan connected to the enlarged portion of the feed pipe and to the discharge end of the grinding machine for forcing material into the separator.

4. An apparatus of the character described, comprising a grinding, pulverizing or shredding machine, means for supplying material to said machine, a separator, a conduit connecting the discharge chute of said machine with said separator, a fan arranged in said conduit for drawing the ground material out of said machine and forcing it into the separator, a dust-settling chamber, a pipe connecting said chamber with said separator for conducting the fine particles of material into the dust-settling chamber, and a connection between said dust-settling chamber and the eye of said fan for supplying air to the fan.

5. An apparatus of the character described, comprising a separator, a dust-settling chamber, a pipe for conducting the dust-laden air from the separator to said chamber so that the dust can settle therein, a conduit that establishes communication between said chamber and the opening in the separator through which the material is introduced, a fan arranged in said conduit, a grinding, pulverizing or shredding machine, means for supplying material to said machine, and a pipe

leading from the discharge end of said grinding machine to the suction side of said fan.

5 6. An apparatus of the character described, comprising a shredding, pulverizing or grinding machine, a feed pipe for conducting material to said machine and provided intermediate its ends with an enlarged portion, a separator, a conduit leading from the enlarged portion of said feed pipe to said separator, and means for creating a suction in said conduit so as to cause the fine particles of material which travel down the feed pipe to pass into the separator before they reach the grinding machine.

15 7. An apparatus of the character described, comprising a hopper for receiving materials, means for separating and discarding the material which it is desired should not be ground, a grinding machine for receiving the material which it is desired to grind, a separator, a fan for causing the material that passes through said grinding machine to enter the separator, a dust-settling chamber, means for causing the dust-laden air to pass from the separator into said dust-settling chamber and thus permit the fine particles of dust to settle therein, and a direct connection

between the dust-settling chamber and the eye of said fan for supplying said fan with air from said chamber. 30

8. An apparatus of the character described, comprising means for separating foreign matter from material that is to be ground, a feed conduit for receiving the material that is to be ground, a discharge conduit for receiving said foreign matter, a grinding machine communicating with said feed conduit, a separator, a dust-settling chamber, pipes forming a continuous conduit that establishes communication between the separator and dust-settling chamber, between the feed end of said machine and the separator, and between the feed end of said machine and dust-settling chamber, a fan for creating a current of air through said continuous conduit, and a pipe leading from the dust-settling chamber to the eye of said fan for supplying air thereto. 35 40 45

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this second day of June 1908. 50

OTTO PORBECK.

Witnesses:

WELLS L. CHURCH,
GEORGE BAKEWELL.