J. W. COX.

APPARATUS FOR PRODUCING COMMINUTED MATERIAL.

APPLICATION FILED FEB. 10, 1917.

1,296,926.

Patented Mar. 11, 1919.

3 SHEETS—SHEET 1.

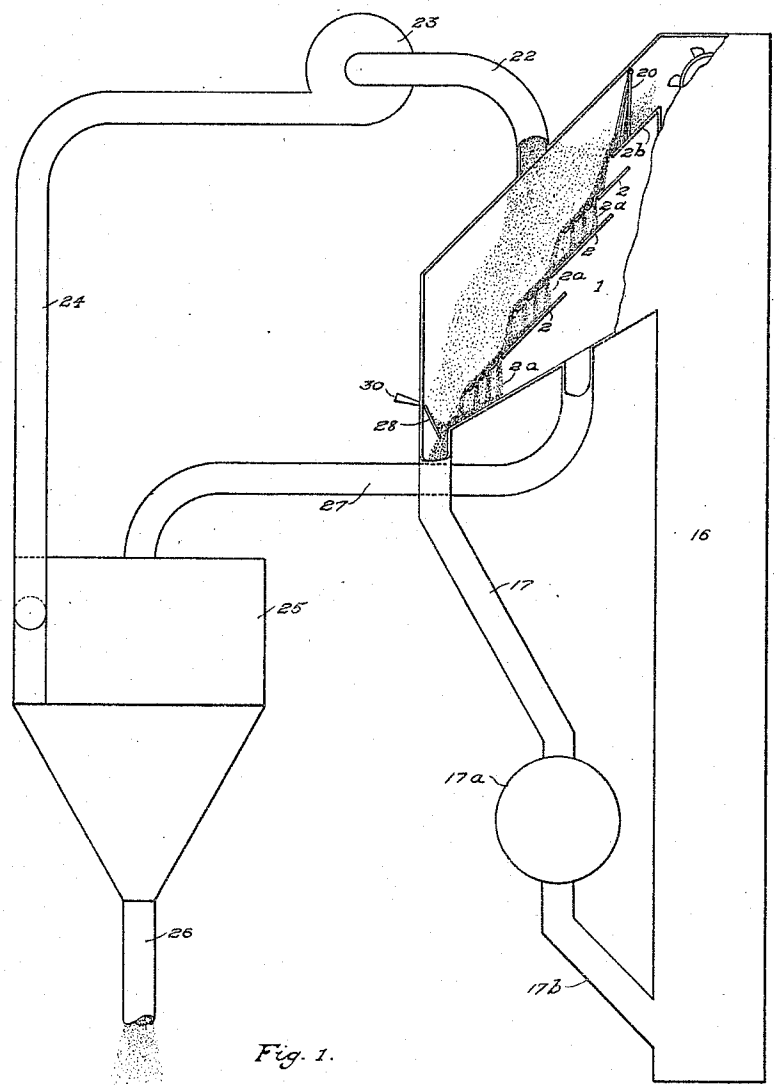


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 3.

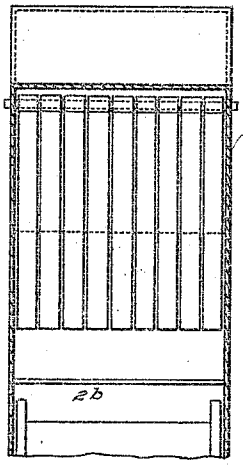


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 4.

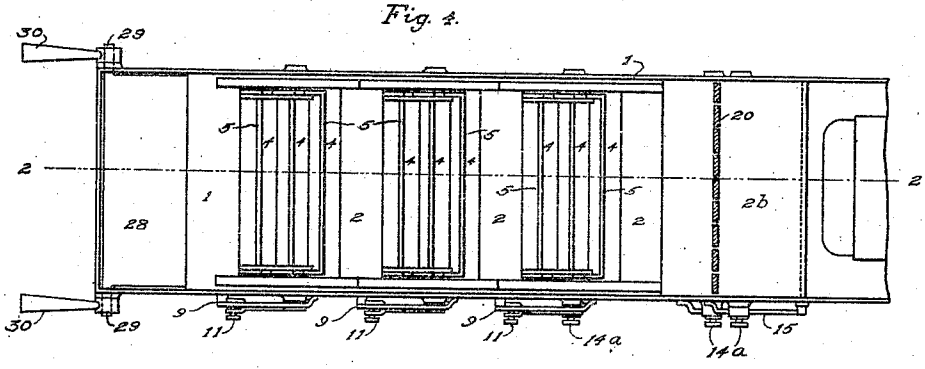


Fig. 5.

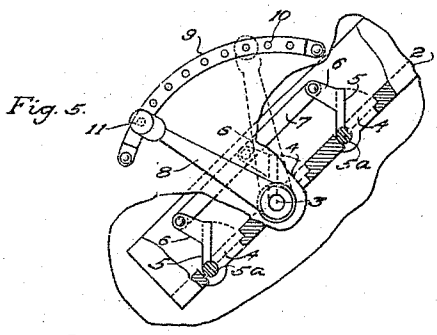


Fig. 6.

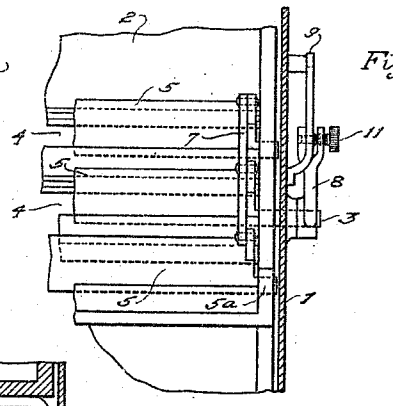
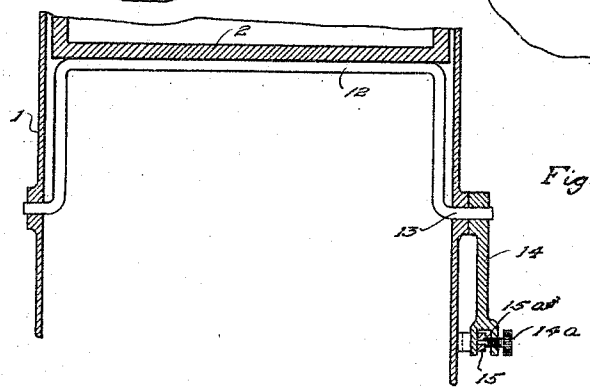


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN W. COX, OF ERIE, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO GEORGE R. METCALF AND ONE-FOURTH TO EDWARD E. WALKER, BOTH OF ERIE, PENNSYLVANIA.

APPARATUS FOR PRODUCING COMMINUTED MATERIAL.

1,296,926. Specification of Letters Patent. **Patented Mar. 11, 1919.**

Application filed February 10, 1917. Serial No. 147,774.

To all whom it may concern:

Be it known that I, JOHN W. COX, a subject of the King of Great Britain, having declared my intention of becoming a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in an Apparatus for Producing Comminuted Material, of which the following is a specification.

This invention relates to an apparatus for producing comminuted material and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

There may be different uses to which this apparatus may be put but the particular use for which the specific apparatus shown is designed is to produce comminuted fuel. Powdered fuel is burned ordinarily by blowing it into a furnace with a blast of air. One of the difficulties experienced in the burning of powdered fuel arises from a failure to uniformly pulverize the coal from which it is produced. With this invention this difficulty is obviated.

The invention is illustrated in the accompanying drawings as follows:—

Figure 1 is a side elevation of the device, partly in section.

Fig. 2 an enlarged central section of the separating chamber on the line 2—2 in Fig. 4.

Fig. 3 a section on the line 3—3 in Fig. 2.

Fig. 4 a section on the line 4—4 in Fig. 2.

Fig. 5 an enlarged elevation, partly in section, showing details of construction of the slanting plates over which material slides.

Fig. 6 a plan view of the parts shown in Fig. 5.

Fig. 7 an enlarged section showing the plate adjusting device.

1 marks a separating chamber. This is simply a box-like structure inclosed ordinarily by sheet metal walls. Arranged in this chamber are the slanting plates 2. Preferably there are a series of these plates arranged one above the other and off-set one from the other so that the material sliding from one of the plates is deposited on the succeeding plate, the arrangement of the plates leaving a passage between them. The plates are mounted on the rods 3 which extend through the chamber 1. Each of the plates is provided with a series of openings 4 extending across the lower ends of the plates and deflecting plates or shutters 5 are arranged over these openings. The end shutters 5 of each series are carried by the rods 5^a and the central shutters by the rod 3. Levers 6 extend from the shutters 5 and these are connected by the links 7. A lever 8 is mounted on a rod 3 outside of the chamber 1. The outer end of the lever 8 travels over a segment 9 having a series of locking openings 10 therein and the arm is provided with a pin 11 which may be placed in the openings so as to lock the lever in adjustment. The rod 3 forms the support of the plate and also the means of adjustment for the shutters. The material slides down the plates 2 and the shutters are so adjusted that material in a thin stream is delivered through each of the openings 4. By thus dividing up the streams all particles of the material are subjected to the current of air.

An adjusting rod 12 supports the free end of each of the plates. It is in the form of a bail or crank, the ends extending through openings 13 in the sides of the chamber 1 (see Fig. 7). An arm 14 is secured to the end 13. The end of the arm 14 operates over a segment 15, the segment having openings 15^a into which a pin 14^a of the arm 14 extends to lock the arm in adjustment. It will be readily seen that by swinging the rod 12 any desired inclination may be given to the plates 2. This variation in adjustment is particularly shown in Fig. 2 wherein the extreme adjustment is shown in dotted lines.

Material is carried up to the upper plate 2^b through an elevator 16, the elevator belt 18 being shown in Fig. 2 as passing over the pulley 19. The material is deposited from the elevator on to the upper plate 2^b and passes by gravity down over the series of plates.

In order to break the momentum of the material as it is deposited on the plate 2^b I provide the damper or shutter 20. This is formed of a series of separate bars hinged at 21 and its purpose is not to prevent the flow of material along the plate 2^b but to check the momentum given to the material as it is thrown from the elevator so that there will be an even stream of material passing down over the plates. This gate not only checks the material and facilitates the spreading of the material over the plate but also forms an air gate.

Air is passed through the passages 2^a. This is accomplished in the device shown as

follows: A pipe 22 leads from the upper part of the chamber to the center of a fan 23 so that the air is drawn from the chamber to this fan. It is discharged from the fan by a pipe 24 which leads to a centrifugal separator 25, the pipe 24 discharging into the separator in a tangential direction. The dust particles are carried to the outer wall of the separator by centrifugal force, thus separating them from the air. The particles then move down the wall by gravity and are discharged through the pipe 26. Air is drawn by a pipe 27 from the center of the separator and the pipe 27 leads to the bottom of the chamber 1. It will be readily seen that air is circulated in this way and that by properly proportioning the fan the velocity of the air can be graduated so as to take up only the finer particles of material. The dropping of the material by gravity through the passages 2^a tends to separate the particles so as to give the air a free play upon the different particles. The finer particles having less weight than will overcome the force of the air to which they are exposed are taken up by the air while the larger particles pass through the air and are carried from plate to plate and finally discharged at the bottom of the chamber 1.

An air gate is provided at the bottom of the chamber 1. This consists of the shutter 28 which is pivoted on a trunnion 29. Weighted arms 30 are secured to the trunnions 29 and normally hold the gate 28 in closed position. When the material has accumulated to some extent above the gate 28, the weight of the material on the gate opens it and the material is discharged, the gate again closing after the discharge of the material. The material is carried by a pipe 17 as it passes the gate 28 to a pulverizer 17^a and passes by a pipe 17^b from the pulverizer to the elevator 16. Fresh material is fed to the pulverizer as well as the material that is carried from the separator so that the operation of pulverizing the coal and taking out from it the dust particles that are sufficiently fine is a continuous one.

What I claim as new is:—

1. In an apparatus for producing comminuted material, the combination of a slanting plate over which the material is passed, said plate having an opening through which the material is discharged from the plate; a rod on which the plate is mounted; a shutter operating over the opening and pivotally mounted concentric with the rod; concentric means for adjusting the plate and shutter; and means for directing a current of air through the material as it is discharged from the plate.

2. In an apparatus for producing comminuted material, the combination of a slanting plate having a series of openings; pivotally mounted shutters over said openings; arms extending from said shutters; links connecting said arms; a swinging mounting for the plate; means concentric with the mounting for operating the arms controlling the shutters; and means for directing a current of air below the openings and in a direction to operate upon material falling through the openings.

3. In an apparatus for producing comminuted material, the combination of devices for conveying the material and directing the same to fall by gravity in an open stream across an air passage; means for creating a current of air through the passage and falling material, comprising a fan; pipes connecting the fan with the inlet and outlet of said passage; and a separator arranged in the pipe circuit.

4. In an apparatus for producing comminuted material, the combination of a slanting plate over which the material is passed and from which it falls by gravity; means for directing a current of air through the material as it falls by gravity, comprising a pipe circuit leading to and from the falling material; means for driving the air through the pipe circuit; and a separator in said circuit.

5. In an apparatus for producing comminuted material, the combination of devices for conveying the material and spreading and directing the same to fall by gravity in an open stream across an air passage; means for creating a current of air through the passage and falling material and take up the finer particles of material; means for gathering the larger particles of material; apparatus for pulverizing the larger particles of material so gathered; means for conveying the larger particles of material so gathered to the pulverizing apparatus; and means for carrying the material from the pulverizing apparatus to said devices.

6. In an apparatus for producing comminuted material, the combination of devices for conveying the material and spreading and directing the same to fall by gravity in an open stream across an air passage; means for creating a current of air through the passage comprising a pipe circuit leading to and from the passage; a separator in the pipe circuit; means for gathering the larger particles of material escaping from the air; apparatus for pulverizing the larger particles so gathered; and means for returning the particles pulverized to said devices.

In testimony whereof I have hereunto set my hand.

JOHN W. COX.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."