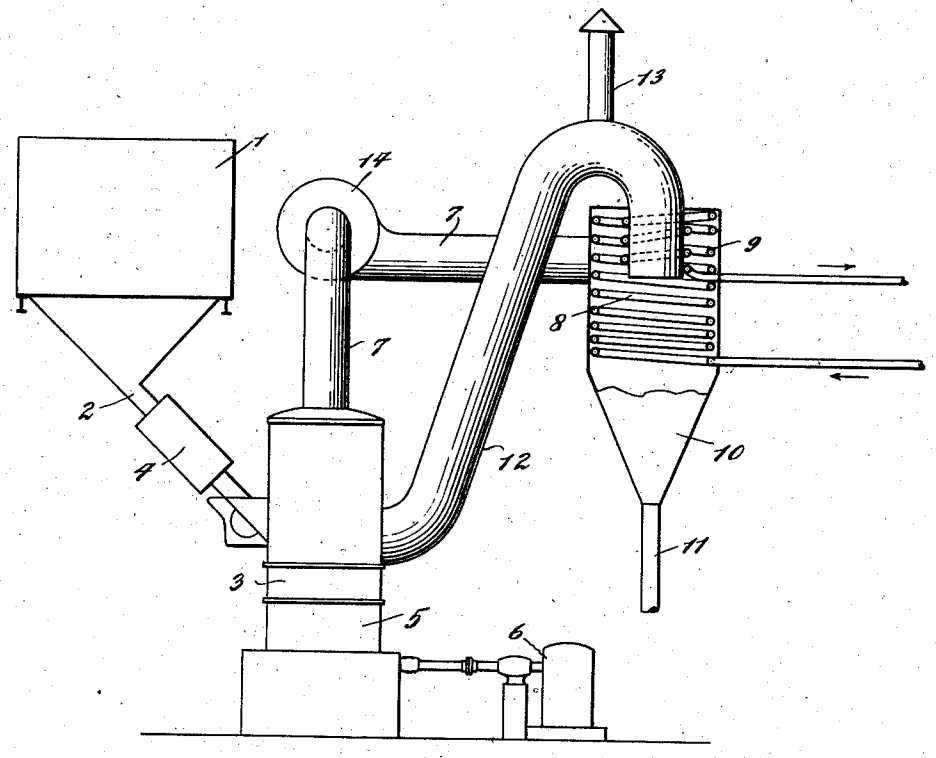
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PROCESS AND APPARATUS FOR PULVERIZING MATERIAL

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PROCESS AND APPARATUS FOR PULVERIZING MATERIAL

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This invention relates to a process and apparatus for pulverizing material in such a manner that the material is obtained in a dry pulverulent state and the grinder is prevented from clogging or becoming stopped up. The invention is applicable to the grinding of various sorts of material, but is especially suitable for grinding coal that may be in the moist or damp state so as to produce powdered fuel.

It has been found heretofore that in pulverizing or grinding materials that contain excessive amounts of moisture, that the moisture interferes with the proper pulverization of the material or retards the pulverization because the damp material coats the surfaces of the grinding elements and does not permit proper functioning of the various parts. The amount of heat generated by the process of pulverization is not sufficient to furnish enough heat for drying the material especially if a considerable amount of moisture is present.

By the present invention, difficulties heretofore encountered in grinding or pulverizing processes and apparatus are overcome and the pulverization is suitably accomplished by using grinders or pulverizers of different types.

The invention will be understood from the description in connection with the accompanying drawing, in which a diagrammatic arrangement of apparatus is indicated for carrying out the invention. In the drawing reference character 1 indicates a storage bin or receptacle for coal or other material that is to be ground. A conduit 2 leads from the bin 1 to the grinder 3 that may be one of the well known types. A heater 4 may be interposed between the bin and the grinder to cause a preliminary heating of the material that is to be ground, and the grinder may also be heated by means of the heater 5, which may be heated from any convenient source of heat 6, that is diagrammatically illustrated.

Air is forced into the grinder and serves to lift the fine particles in the well known manner, and the dust-laden air passes through the outlet 7 to a separator 8 that may be of the cyclone type or of the well known sort that is suitable for separating gaseous and solid particles from each other. The separator 8 is provided with means for heating the same, which may be, for example, a heating coil 9 or the separator may be heated in any other convenient manner. The lower portion 10 of the separator is shown as being funnel-shaped and an outlet 11 therefrom may lead to a furnace or storage receptacle. An outlet 12 extends from the upper portion of the separator 8 to the grinder 3, and is provided with a vent 13 to permit a portion of the gaseous fluid to escape so that the concentration of moisture in the gaseous fluid will not become too great. A fan 14 is provided for forcing the circulation of the air or gaseous fluid through the grinder and separator back to the grinder, and fresh air or other gaseous fluid may be admitted at any convenient point in the cyclone separator to replace that which is vented out through the vent 13.

By this invention the moisture is prevented from condensing in the separator and the powdered material is kept dry, and at the same time the air is permitted to remain sufficiently concentrated with moisture to prevent explosions from accidentally taking place. The heater 4 between the storage bin and the grinder, as well as the heater 5 for the grinder itself, may both be dispensed with when there is not too much moisture in the material to be ground, since the heat generated by the grinding operation together with the heat applied in the separator 8 will be sufficient to produce thoroughly dried material that is collected in the separator.

I claim:

1. The process of pulverizing materials which comprises grinding the material while passing a gaseous fluid through the grinding zone to remove fine particles and thence through a separating zone where the fine particles and gaseous fluid are separated, said separating zone being maintained at an elevated temperature by heating it independently of the material passing therethrough.

2. The process of pulverizing material which comprises grinding the material while

passing a gaseous fluid through the grinding zone to remove fine particles, thence through a separating zone where the fine particles and gaseous fluid are separated, said separating zone being maintained at an elevated temperature by heating it independently of the material passing therethrough, and returning gaseous fluid from the separator to the grinding zone.

3. The process of pulverizing material which comprises grinding the material while passing a gaseous fluid through the grinding zone to remove fine particles, thence through a separating zone where the fine particles and gaseous fluid are separated, said separating zone being maintained at an elevated temperature by heating it independently of the material passing therethrough, returning gaseous fluid from the separator to the grinding zone, and venting a portion of it to the atmosphere.

4. The process of pulverizing material which comprises forcing air through the grinding zone and thence through a separating zone where the air is separated from the solid particles, said separating zone being maintained at an elevated temperature by heating it independently of the material passing therethrough.

5. The process of pulverizing material which comprises forcing air through the grinding zone, thence through a separating zone where the air is separated from the solid particles, said separating zone being maintained at an elevated temperature by heating it independently of the material passing therethrough, and returning a portion of the air to the grinding zone.

6. In an apparatus for pulverizing material, a grinder, means for passing a gaseous fluid through said grinder to remove the fine particles, a separator through which the dust laden fluid passes, and means for heating the separator independently of said gaseous fluid.

7. In an apparatus for pulverizing material, a grinder, means for passing a gaseous fluid through said grinder to remove the fine particles, a separator through which the dust laden fluid passes, means for heating the separator independently of said gaseous fluid, and means for returning a portion of the gaseous fluid from said separator to said grinder.

8. In an apparatus for pulverizing material, a grinder, means for passing a gaseous fluid through said grinder to remove the fine particles, a separator through which the dust laden fluid passes, means for heating the separator independently of said gaseous fluid and means for returning a portion of the gaseous fluid from said separator to said grinder, and for venting another portion thereof to the atmosphere.

9. In an apparatus for pulverizing material, a grinder, means for passing a gaseous fluid through said grinder to remove the fine particles, a cyclone separator through which the dust laden fluid passes, and means for heating the separator independently of said gaseous fluid.

10. In an apparatus for pulverizing material, a grinder and a separator, means for circulating a gaseous fluid between said grinder and separator and means to heat said separator independently of said gaseous fluid.

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