

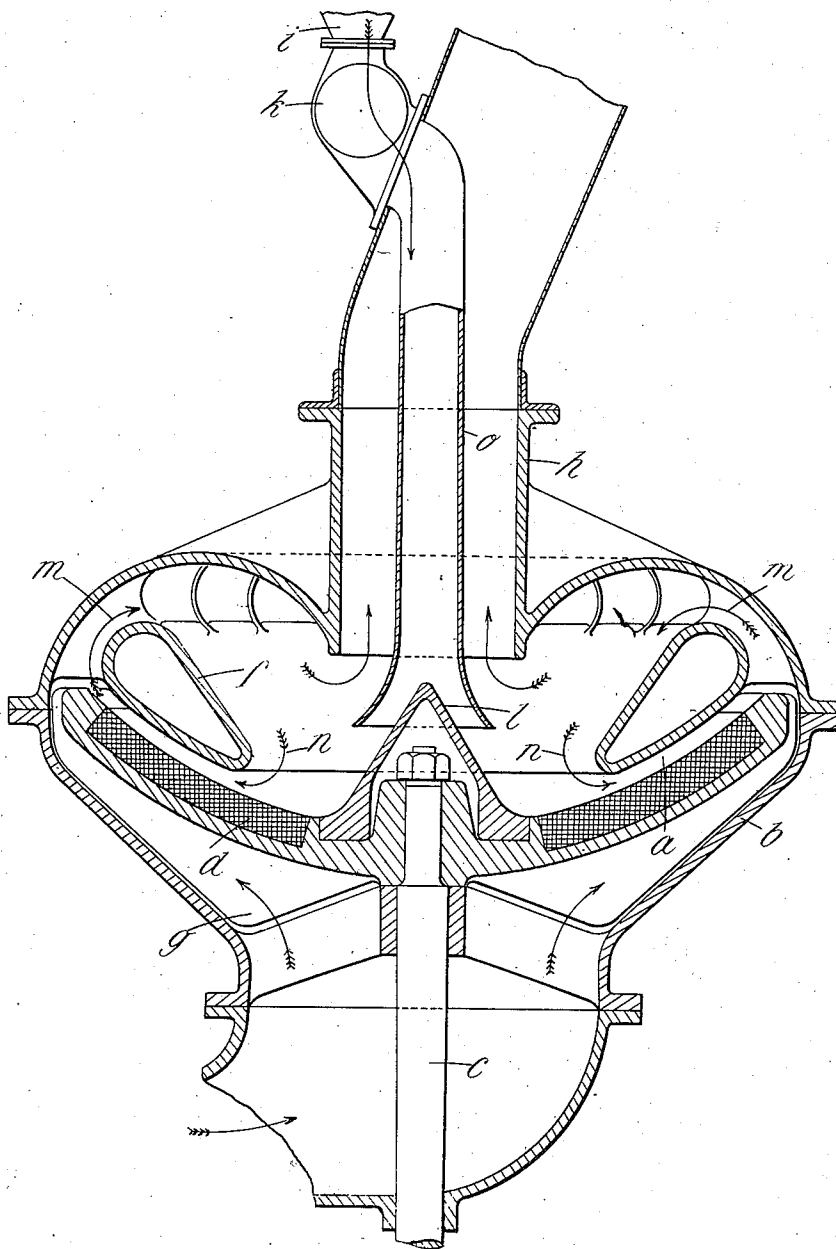
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APPARATUS FOR PULVERIZING

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INVENTOR

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PULVERIZING.

Application filed February 24, 1927, Serial No. 170,441, and in Great Britain April 1, 1926.

Rotary pulverizers are constructed to crush the material, but it is generally recognized that the final state of subdivision is chiefly due to attrition of the crushing particles against surfaces in the mill.

By my invention the material to be pulverized is reduced mainly by attrition.

I feed the material on to a disc revolving rapidly on a substantially vertical axis and contained in a casing the portion of which that is above the disc is of generally diminishing cross section in upward direction. The particles of the material travel on the disc under centrifugal force, suffering attrition. When they leave the periphery of the disc they are returned to the space above the disc partly by reflection from the inner surface of the casing, or from ribs or plates which this surface may carry, and partly by deflection by an air current set up in the casing by the revolving disc. Falling again upon the disc the particles again travel on the latter under centrifugal force, suffering further attrition and are again returned as before to the disc.

In order to separate the sufficiently finely ground particles from those that are coarser, air may be admitted to the casing and a vent therefor provided. The current of air through the casing thus created, and if desired enhanced by forming the under surface of the disc with blades or the like so that the disc may act as a fan, carries the fine particles through the vent, while the coarse particles return to the disc aforesaid. This effect may largely be due to the swirling motion of the current caused by the revolving disc, since the coarse, heavier particles are prevented by centrifugal force from escaping through the vent when this is axial.

Since the pulverizing action is mainly due to attrition, it is useful to provide an abrasive surface to the disc and the inner surface of the casing may also be of a particularly abrasive nature.

For the same reason it is advantageous that the disc should be dished or of bowl-shape, since this formation increases the pressure of the particles against the surface of the disc as they move under centrifugal force.

The invention is particularly applicable to the pulverizing of coal.

The accompanying drawing is an axial sec-

tion through a mill constructed in accordance with the invention.

The circular dish *a* is mounted within the casing *b* to rotate at high speed together with the shaft *c*. The greater part of the surface of the dish consists of an abrasive material *d*, such as carborundum.

The upper part of the casing *b* curves inwards towards the centre of the disc, as shown, and is cast with an internal dished ring *f*, which is preferably hollow for the sake of lightness. The under surface of this ring has substantially the same curvature as that of the upper surface of dish *a* and the two surfaces are fairly close together.

The dish *a* is cast with blades *g* which operate as the blades of a fan in the conical lower portion of the casing *b*.

The axial-pipe *h* serves for passage of air leaving the mill and carrying the finely subdivided product. The material to be ground is fed from a hopper *i* by any well-known feeding device *k*. It passes down a chute *e* co-axial with pipe *c*, and is distributed by the cone *l* on to the dish *a* which is revolved at a very high speed.

The particles of material are compelled by centrifugal action to travel up the curved surface of dish *a* under a pressure far exceeding that represented by their weight, so that they are reduced in size by attrition against the grinding material *d*. At the periphery of the disc they enter a rapid current of air induced by the blades *g*. Those particles which are not sufficiently fine to be diverted at once by this air current and carried as indicated by arrow *m* into the space immediately below the pipe *h*, strike the internal surface of the casing *b* and are reflected into the said space, where they fall back on to the plate *a* to be further treated. The fines are carried by the air current through the pipe *h*, to be disposed of in known manner.

The air induced by the fan blades *g* may be preheated, if desired; but even with air at ordinary temperature, the drying effect is good, because local currents of air, as indicated by arrows *n*, are set up in the mill.

Having thus described the nature of the said invention and the best means I know of carrying the same into practical effect, I claim:—

1. An attrition pulverizing mill comprising a casing, a disc within the casing having an attrition surface, means whereby said disc may be revolved at high speed, means for feeding material to be pulverized to the center of the disc, the inner surface of the portion of the casing above the disc inclining inwardly and then downwardly to a central exit opening, and means for creating a current of air upwardly past the periphery of the disc.

2. An attrition pulverizing mill comprising a casing, a disc within the casing having an attrition surface, means whereby said disc may be revolved at high speed, means for feeding material to be pulverized to the center of the disc, the inner surface of the portion of the casing above the disc inclining inwardly and then downwardly to a central exit opening, and means for creating a cur-

3. An attrition pulverizing mill comprising a casing, a disc within the casing having an attrition surface, means whereby said disc may be revolved at high speed, means for feeding material to be pulverized to the center of the disc, the inner surface of the portion of the casing above the disc inclining inwardly and then downwardly to a central exit opening, the central portion of said casing above the disc being unobstructed, and means for creating a spirally moving current of air flowing upwardly past the periphery of the disc.

4. An attrition pulverizing mill comprising a casing, a disc within the casing having an attrition surface, means whereby said disc may be revolved at high speed, means for feeding material to be pulverized to the center of the disc, the inner surface of the portion of the casing above the disc inclining inwardly and then downwardly to a central exit opening, the downwardly inclined portion of said casing being unobstructed, and means for creating a spirally moving current of air flowing upwardly past the periphery of the disc.

5. An attrition pulverizing mill comprising a casing, a disc within the casing having an attrition surface, means whereby said disc may be revolved at high speed, means for feeding material to be pulverized to the cen-

ter of the disc, the inner surface of the portion of the casing above the said disc inclining upwardly and then inwardly to a central exit opening which is lower than the highest point on the inner surface of said casing, and means for creating a current of air upwardly past the periphery of the said disc.

6. An attrition pulverizing mill comprising a casing, a dished disc within the casing having an unobstructed attrition surface, means whereby said disc may be revolved at a high speed, a chute above the center of the disc for discharging material to be pulverized onto the disc, an outlet pipe surrounding said chute, the diameter of the outlet pipe being substantially less than the diameter of the disc, and means for creating a current of air upwardly past the periphery of the disc.

7. A pulverizing mill comprising a casing, a dished disc within the casing and of a slightly smaller diameter than the widest portion of the said casing, a substantially vertical shaft on which the said disc is mounted and which is adapted to rotate at high speed, the part of the said casing which is above the disc being curved inwardly towards the center of the disc, a dished ring mounted within the casing so as to have its inner surface near to the upper surface of the said disc, an abrasive material forming a part of the upper surface of the said disc, fan blades carried by the under surface of the said disc, an inlet for air to the casing below the disc, an axially arranged outlet for air on the casing above the disc, a feed pipe co-axial with the said outlet, and means for feeding the material to be pulverized on to the disc through the said feed pipe.

8. An attrition pulverizing mill comprising a casing, a dished disc within the casing having an attrition surface, means whereby said disc may be revolved at high speed, means for feeding material to be pulverized to the surface of the disc, the casing having a central exit opening above the disc, the plane of the exit entrance being substantially proximate to the horizontal plane of the upper edge of the dished disc, and means for creating a current of air upwardly past the periphery of the disc.

In testimony whereof I have signed my name to this specification.

WILFRED ROTHERY WOOD.

3.

CERTIFICATE OF CORRECTION.

Patent No. 1,697,704.

Granted January 1, 1929, to

WILFRED ROTHERY WOOD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 20, claim 2, strike out the syllable "cur-"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of February, A. D. 1929.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.