Feb. 20, 1923. 1,446,151.

C. E. BLYTH.

MACHINE FOR THE PRODUCTION OF POWDERED FUEL.

FILED APR. 18, 1921. 2 SHEETS—SHEET 1.

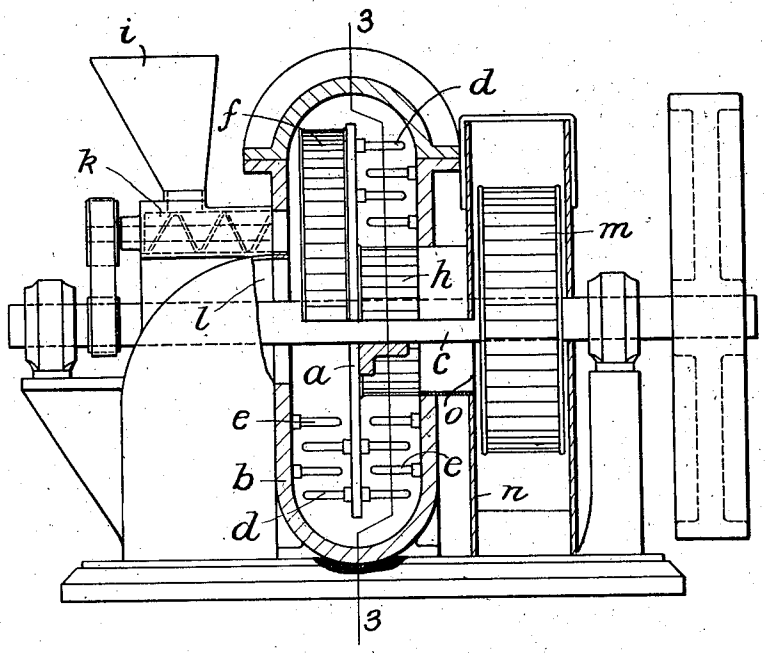

Fig: 1.

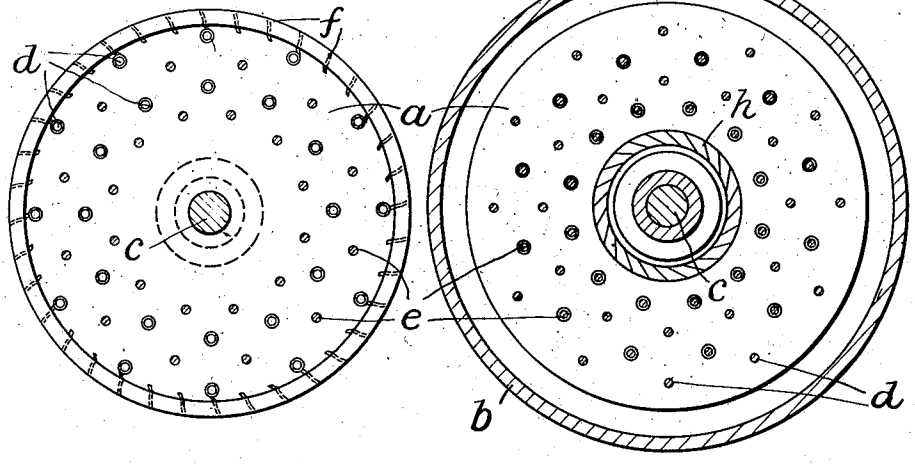

Fig: 2.

Fig: 3.

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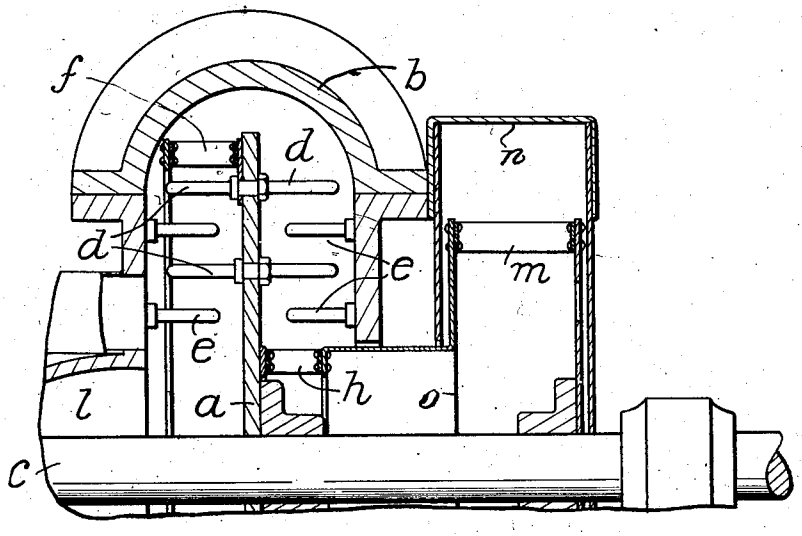

Fig: 4.

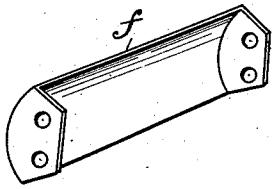

Fig: 7.

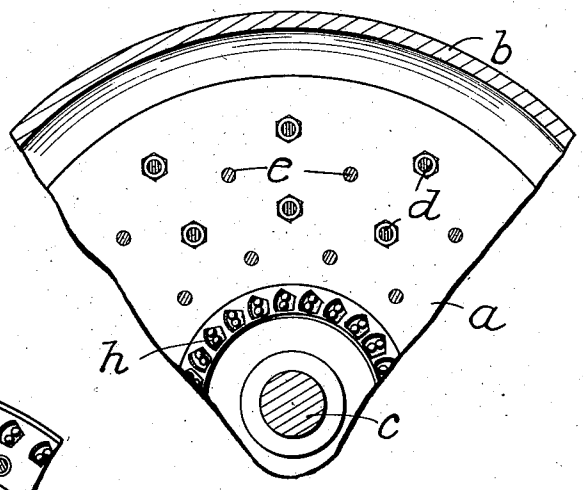

Fig: 6.

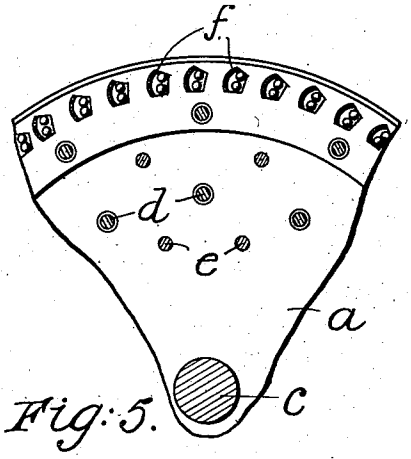

Fig: 5.

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Patented Feb. 20, 1923. 1,446,151

UNITED STATES PATENT OFFICE.

CHARLES EDWARD BLYTH, OF DUNCHURCH, NEAR RUGBY, ENGLAND.

MACHINE FOR THE PRODUCTION OF POWDERED FUEL.

REISSUED

Application filed April 18, 1921. Serial No. 462,270.

To all whom it may concern:

Be it known that I, CHARLES EDWARD BLYTH, a subject of the King of Great Britain, residing at Dunchurch, Near Rugby, in the county of Warwick, England, have invented new and useful Improvements in Machines for the Production of Powdered Fuel, of which the following is a specification.

This invention relates to pulverizing machines of the kind comprising a casing which is divided into first and second chambers by means of a disc mounted rotatably therein and carrying impellers or beaters on each face.

The object of the present invention is to improve the efficiency of such machines more especially when intended for use in the production of powdered fuel.

In a machine constructed according to this invention the first and second chambers have internal communication with each other and a space is provided between the free ends of the impellers on the disc and the interior surface of the casing to allow for free circulation of the suspended material prior to its delivery from the second chamber through an orifice centrally arranged with respect to the disc.

In order that the invention may be clearly understood and readily carried into practical effect reference is made in further describing the same to the accompanying drawing, in which

Figure 1 is a longitudinal sectional view of one form of machine for carrying out the invention.

Figures 2 and 3 are sectional views shewing opposite faces of the beater disc, Figure 3 being taken on the line 3—3 of Figure 1.

Figure 4 is a sectional view of the upper part of the machine shewing more clearly the arrangement of the fan blades on the beater disc and of the contra flow deflectors at the delivery orifice.

Figures 5 and 6 are each partial side views taken from opposite sides of the beater disc shewing the fan blades and contra flow deflectors respectively in section.

Figure 7 is a perspective view on a larger scale of one of the fan blades or deflectors.

Referring to the drawing, the beater disc *a* of which there may be one only, as shown, is rotatably mounted in a fixed casing *b* through which the driving shaft *c* passes. Each face of the said disc carries a series of outwardly projecting impellers or beaters *d* which pass between fixed beaters *e* on the inside walls of the casing. Between the free ends of the impellers *d* and the inside walls of the casing a space which, as shewn, is more than sufficient for clearance, is left to allow for free circulation of the suspended material.

The intake side of the beater disc is provided at its periphery with an annular series of closely arranged transversely curved fan blades *f* having flanged ends as seen in Figure 7 whereby they are riveted at one end to the disc *a* and at the other end to an annular plate *g*. The object of these blades, the arrangement of which is clearly shewn in Figure 5, is to keep the material under treatment against the action of centrifugal force set up by the rotating disc *a*, within the area swept by the beaters until it has been reduced to such fineness that, the effect of centrifugal force on each particle being negligible, it will pass with the air current between the blades *f* and be uniformly distributed thereby around the disc *a* into the second or delivery chamber at the other side of the said disc.

On the other or delivery side of the beater disc and surrounding the hub of the same is a smaller ring of curved blades *h* which are arranged parallel with the axis of the machine and riveted by their flanged ends to the disc *a* and to an extending flange on the main delivery or exhaust fan *m*, as seen in Fig. 4. These blades *h* as will be seen from Figure 6 are arranged close together so as to preclude the possibility of any coarse particles that may have found their way into the second or delivery chamber passing through the delivery orifice and to return such particles back amongst the beaters until reduced to the requisite degree of fineness that they will pass with the air current between the blades *h*.

The fuel, previously reduced to about the size of one inch cubes, is fed continuously into one end of the machine from a hopper *i* by means of a feed screw *k* whence it falls amongst and is rapidly reduced by the beaters to a fine powder. At or about the same end of the machine an opening *l* which may be adjustable is provided for the entrance of hot air the temperature and pressure of which may be varied. The heat of the waste gases from the furnace may be conveniently

and economically utilized for heating the air.

A delivery fan *m* is provided at the other side of the machine and arranged within a casing *n* which is in direct communication with the delivery orifice *o* by means of the conduit formed by the blades *h*.

It is important to note that the suspended fuel, preliminarily reduced and dried in the inlet compartment, is subject to further reduction by impact, attrition or abrasion in the dense atmosphere formed during its centripetal passage through the delivery compartment toward the central delivery orifice.

It is found that with this machine the fineness of the powdered product can be varied at will by suitably regulating the velocity of exit, as by introducing more or less air direct into the casing of the fan *m*. If this terminal velocity of the material is reduced below the internal maximum velocity produced by the disc *a*, internal circulation is set up, the material delivered at the edge of the disc returning by way of the space provided for the purpose as shewn in the drawing between the free ends of the impellers *d* and the adjacent walls of the casing toward the low pressure zones at the centre of the disc whence it is again impelled toward the edge of the disc. This takes place to a more or less extent at both sides of the disc so that by the time the material reaches the delivery orifice it is more finely divided than where the path of the material through the machine is comparatively direct, as happens when the terminal velocity of the material equals or exceeds its maximum internal velocity.

I claim.

1. A pulverizing device comprising a stationary casing having a feeding and discharge opening on opposite sides, a disk rotatably mounted in said casing between said openings and having impellers on its opposite sides, beaters secured on the side walls of said casing intermeshing with said disk impellers, fan blades secured to the inlet side of said disc adjacent its rim, and blades secured to said disc on the opposite side thereof from said fan blades forming a conduit for the fines.

2. A pulverizing device comprising a stationary casing having a feeding and discharge opening on opposite sides, a disk rotatably mounted in said casing between said openings, impellers projecting from opposite sides of said disk with a space more than sufficient for clearance between their free ends and the side walls of said casing, beaters secured on said side walls intermeshing with said disk impellers, a fan chamber communicating with said discharge opening and blades secured to the adjacent side of said disk and forming a conduit from said casing to said fan chamber.

3. A pulverizing device comprising a stationary casing having a feeding and discharge opening on opposite sides, a disc rotatably mounted in said casing between and co-axially with said openings and having impellers projecting from its opposite sides with a space more than sufficient for clearance between the free ends of said impellers and the inside walls of said casing, beaters projecting from the inside walls of said casing, a fan chamber and means passing through said discharge opening for establishing communication between said fan chamber and said casing and for preventing coarse material leaving the latter.

CHARLES EDWARD BLYTH.