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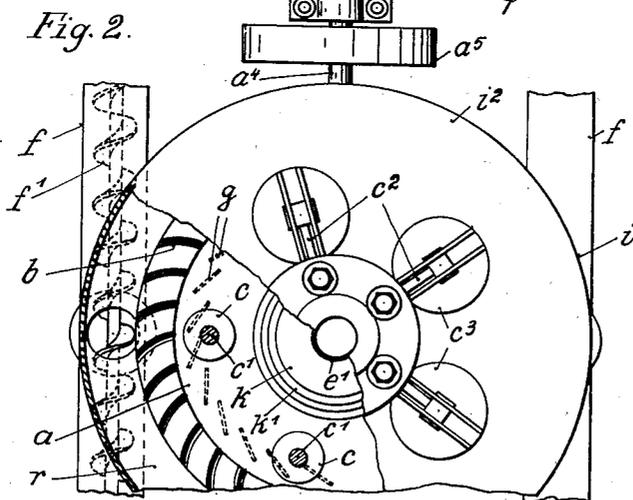
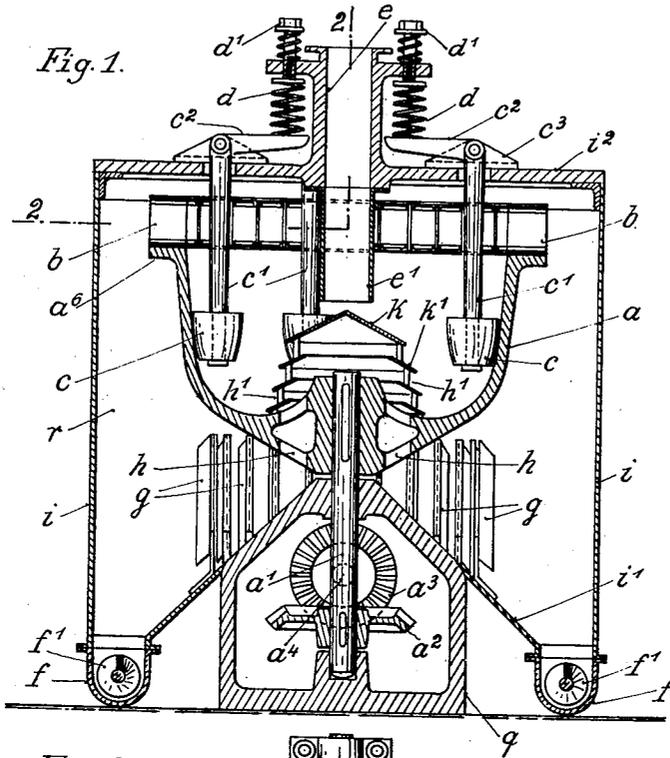
E. C. LOESCHE

1,733,417

PULVERIZING MILL

Filed Feb. 10, 1926

3 Sheets-Sheet 1



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Fig. 3.

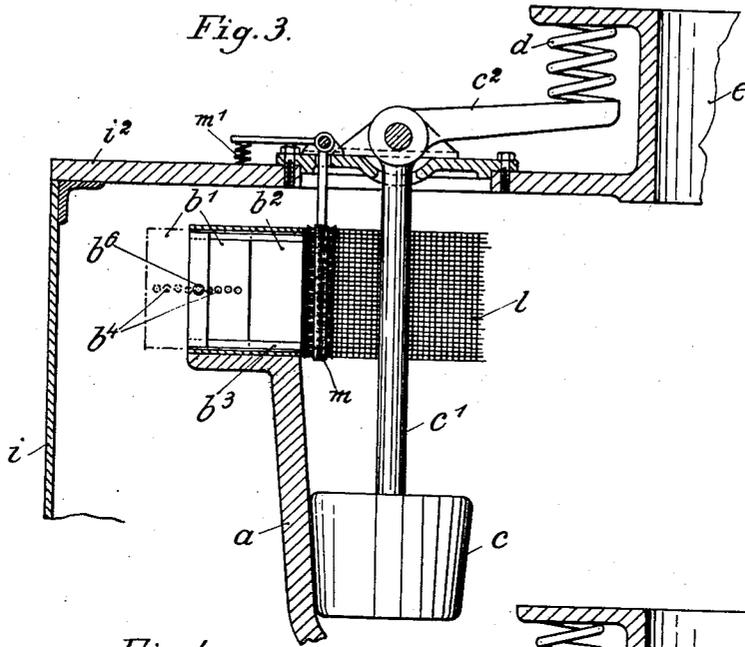
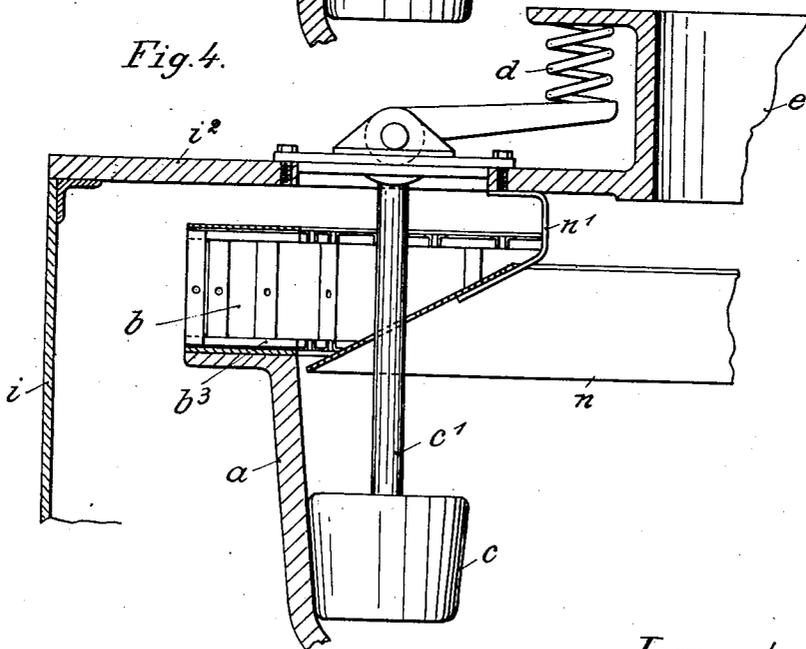


Fig. 4.



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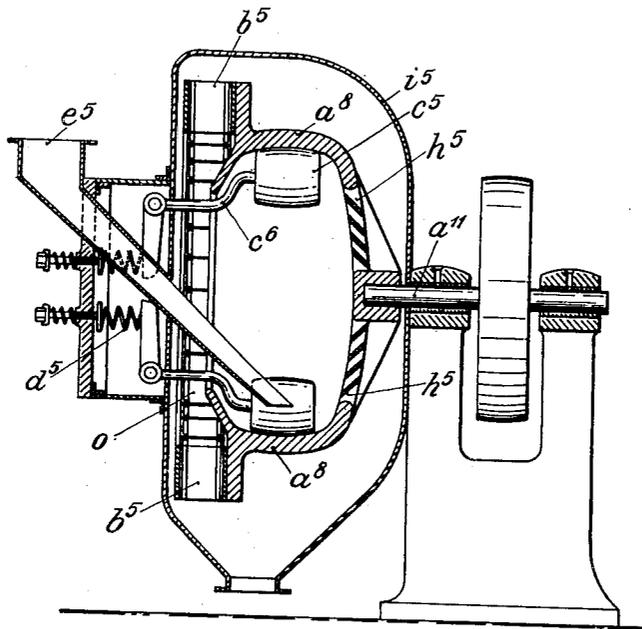
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Fig. 5.



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UNITED STATES PATENT OFFICE

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PULVERIZING MILL

Application filed February 10, 1926, Serial No. 87,260, and in Germany February 12, 1925.

My invention relates to improvements in pulverizing mills for pulverizing materials of various kinds, in which the material pulverized to the desired degree of fineness is immediately separated from the coarse material by means of a current of air. Mills of this type such as are now in use comprise a rotary table formed with a track, crushing or pulverizing rollers bearing on said track and adapted to be rotated by frictional engagement therewith about their own axes, a fan for producing a current of air, and a chamber for separating the fine material from the current of air. The object of the improvements is to provide a pulverizer of this type which is simple in construction and effective in operation, and which requires little space, and with this object in view my invention consists in combining the pulverizing and sifting means into a single apparatus, the rotary table provided with the track being constructed for forming the rotary sifting table and carrying vanes adapted to produce a current of air for removing the pulverized material from the said table.

For the purpose of explaining the invention two examples embodying the same have been shown in the accompanying drawings, in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawings,

Fig. 1 is a sectional elevation showing my improved pulverizing mill,

Fig. 2 is a top-plan view thereof partly in section taken on the line 2—2 of Fig. 1,

Figs. 3 and 4 are detail sectional elevations on an enlarged scale of a part of the pulverizing and separating apparatus, and illustrating modifications of the separating apparatus, and

Fig. 5 is a sectional elevation of a pulverizer showing another modification.

In the example shown in Figs. 1 and 2 my improved pulverizing mill comprises a cylindrical casing *i* having a lid *i*² and a preferably conical bottom *i*¹ the central part of which is provided by a bearing block *g*. Within the said casing there is a rotary crush-

ing table *a* in the form of a bowl keyed to a vertical shaft *a*¹ rotatably mounted within the bearing block *g* and being mounted in a certain distance from the walls of the casing *i* to provide an annular free space *r* in the latter. To the bottom part of the shaft *a*¹ a bevel gear *a*² is keyed which is in mesh with a bevel gear *a*³ keyed to a shaft *a*⁴ carrying a belt pulley *a*⁵. The said pulley is adapted to be rotated by means of a belt from a suitable driving member. The inner wall or track of the table *a* is engaged by pulverizing rollers *c* rotatably mounted on arms *c*¹ having rocking support on bearing blocks *c*³ mounted on the lid *i*², and the arms *c*¹ are provided with laterally projecting arms *c*² engaged by springs *d* tending to force the rollers *c* outwardly and into crushing engagement with the track of the table *a*. The lid *i*² is formed with an axial tubular member *e* opening into a pipe *e*¹ fixed to the bottom of the lid *i*² and adapted to deliver the material to be disintegrated into the bowl-shaped table *a*, a conical deflector *k* being provided below the delivery end of the pipe *e*¹ for throwing the material on the bottom face of the table *a* and away from holes *h* made in the bottom wall of the said table near the axis thereof. Similar deflecting members *k*¹ are provided below the member *k*, and between the members *k* and *k*¹ passages *h*¹ are provided for permitting a current of air to pass through the bowl-shaped table *a*, as will be described hereafter.

At its top the table *a* is formed with a flange *a*⁶, and on the said flange there are vanes *b* disposed at suitable angles to the radius of the table *a* and adapted, upon rotation of the table *a*, to produce a current of air from the inner part of the table *a* outwardly and into the space *r* of the casing *i*. Concentrically of the holes *h* upright slats *g* are secured to the bottom of the table *a* which slats are disposed in the manner of the Venetian blinds. At the bottom the receptacle *i* is provided with gutters *f* containing screw conveyers *f*¹ for removing the pulverized material from the casing or receptacle *i*.

The operation of the apparatus is as follows:—

The table *a* is rotated from a suitable source of power through the intermediary of the pulley *a*⁵, the shaft *a*⁴, the bevel gear wheels *a*³, *a*² and the shaft *a*¹, and it imparts rotary movement to the rollers *c* held in frictional and yielding engagement therewith by the springs *d*. By the rotation of the vanes *b* carried by the table *a*, a current of air is produced which flows from the inner part of the table into the casing *i* and through the holes *h* and the passages *h*¹. The current delivered through the passages *h*¹ is directed downwardly and on the inner face or track of the table *a*. The material to be ground is supplied through the tubular member *e* and the pipe *e*¹ and it falls over the members *h* and *h*¹ on the bottom of the table *a*. By centrifugal action it moves outwardly and upwardly and into position for being crushed by the rollers *c*. After the material has been reduced to a certain degree of fineness the blast of air delivered through the passages *h*¹ separates the fine particles from the coarse and carries the same upwardly and into the annular space *r* of the casing *i*. It appears therefore that the table *a* has the function to crush the material in connection with the rollers *c*, and to separate the fine particles from the coarse particles. Within the annular space *r* the velocity of the current of air is reduced, the cross-sectional area of the said space being larger than that of the inner part of the table *a*. Further, the current of air impinges upon the slats *g*, so that the ground material is separated from the current of air and is deposited on the bottom *i*¹ of the casing *i*, from whence it is removed by the screw conveyers *f*¹. The air from which most of the ground material has thus been separated passes between the slats *g* and through the holes *h* and passages *h*¹ into the cavity of the table *a*, where it is again used for separating the ground material.

The pressure of the rollers *c* and therefore the crushing power thereof may be regulated by means of screws *d*¹ acting on the springs *d*, and adapted to regulate the tension thereof.

By varying the circumferential velocity of the table *a*, regulating the crushing pressure of the rollers *c* and the supply of material through the tubular member *e* the pulverizing effect of the rollers *c* and the separating effect of the apparatus may be varied.

In the operation of the apparatus I have found that, sometimes, it is desirable to provide further means for regulating the blast of air. In Fig. 3 I have shown a modification of the apparatus in which such means have been shown by way of example. As shown in the said figure the vanes are made in two sections *b*¹ and *b*² in sliding or telescoping engagement with each other, the sections *b*² being formed at their sides with elongated

guide pockets *b*³ having the sections *b*¹ sliding therein. By pulling the sections *b*¹ more or less outwardly the intensity of the blast of air is varied. The sections *b*¹ and *b*² are fixed to each other by suitable means. To show what may be done, the sections are formed with corresponding holes *b*⁴ for passing a screw *b*⁶ therethrough.

Further, the figure shows a cylindrical sieve *l* made from wire or perforated sheet metal at the inner or intake end of the fan provided by the vanes *b*¹, *b*², the mesh of the said sieve corresponding to the desired degree of fineness of the material. The sieve is fixed to the sections *b*² of the vanes, so that it takes part in the rotary movement of the table *a*. For removing the coarse material from the inner face of the sieve *l* a cylindrical brush *m* is provided which is suspended from the lid *i*² and acted upon by a spring *m*¹ tending to force the same against the inner face of the sieve *l*. By the rotary movement of the sieve *l* relatively to the stationary brush *m* the meshes of the sieve are cleaned.

In Fig. 4 I have shown a modification in which an annular lip or interceptor *n* is provided within the table *a*, the said lip being fixed to the lid *i*² by arms *n*¹. The object of the said interceptor is to prevent the outward movement of the material from the table in case of an excessive supply and to intercept any coarse particles which might be carried upwardly from the table *a* by the blast of air.

In Fig. 5 I have shown a modification in which the rotary table *a*⁸ is mounted on a horizontal shaft *a*¹¹. The crushing rollers *c*⁵ are rotatably mounted on horizontal arms *c*⁶ rockingly mounted on the left hand wall of the casing *i*⁵ and acted upon by springs *d*⁵. *b*⁵ are the vanes for producing the current of air and *h*⁵ the passages made in the wall of the table *a*⁸ for admitting the current of air into the cavity of the table. The material is supplied to the table *a*⁸ through an inclined chute *e*⁵, and the reduced material is carried through the annular passage *c* provided between the left hand face of the table *a*⁸ and the left hand end wall of the casing *i*⁵.

While in describing the invention reference has been made to particular examples embodying the same I wish it to be understood that my invention is not limited to the constructions shown in the drawings, and that various changes may be made in the general arrangement of the apparatus and the construction of its parts without departing from the invention.

What I claim is:—

1. A pulverizer, comprising a rotary table formed with a pulverizing track adapted to rotate with the table, pulverizing members engaging said track and rotatably journaled on axles which are non-rotatable relative to said table, vanes carried by said table at the top thereof and constructed for producing a

current of air, means to direct said current of air across the material being crushed in a direction for separating the pulverized material from the material being crushed, and a container in position for receiving the current of air and the crushed material carried thereby.

2. A pulverizer, comprising a rotary bowl-shaped table formed with a pulverizing track adapted to rotate with the table and having holes near its axis, vanes carried by said table at the top thereof and constructed for producing a current of air across said track and in a direction for separating the pulverized material from the material being crushed, pulverizing rollers in engagement with said track, and a casing enclosing the rotary table.

3. A pulverizer, comprising a rotary bowl-shaped table formed with a pulverizing track and having holes near its axis, vanes carried by said table and constructed for producing a current of air through said holes and bowl-shaped table, deflecting members in position for directing the current of air from said holes towards said track, pulverizing rollers in engagement with said track, and a casing enclosing the rotary table.

4. A pulverizer, comprising a rotary table formed with a pulverizing track and having holes near its axis, vanes carried by said table and constructed for producing a current of air across said track and in a direction for separating the pulverized material from the material being crushed, pulverizing rollers in engagement with said track, a casing enclosing the rotary table, and plates disposed within said casing in position for intercepting the current of air.

5. A pulverizer, comprising a rotary bowl-shaped table having a vertical axis and formed with a pulverizing track and having holes in its bottom near its axis, vanes carried by said table and constructed for producing a current of air through said holes and bowl-shaped table, pulverizing rollers in engagement with said track, an axial tubular member for feeding the material to be ground to the bottom of said table, a conical deflecting member at the delivery end of said tubular member and above said holes adapted to direct the material from said tubular member towards the circumference of said table, and a casing enclosing said rotary table.

6. A pulverizer, comprising a rotary table having a pulverizing track, vanes carried by said table at the margin thereof and constructed for producing upon rotation of the table a current of air across said pulverizing track, pulverizing members in engagement with said track, a sieve disposed concentrically of said table at the intake end of said vanes, and a casing in position for taking up the current of air and material carried thereby.

7. A pulverizer, comprising a rotary table

having a pulverizing track, vanes carried by said table at the margin thereof and constructed for producing upon rotation of the table a current of air across said pulverizing track, pulverizing members in engagement with said track, a sieve disposed concentrically of said table at the intake end of said vanes, a relatively fixed member engaging said sieve at the intake side thereof and constructed for cleaning the same, and a casing in position for taking up the current of air and material carried thereby.

8. A pulverizer, comprising a bowl-shaped rotary table formed near its axis with holes and having a pulverizing track, vanes carried by the margin of said table constructed for producing upon rotation of the table a current of air, pulverizing members in engagement with said track, a sieve disposed concentrically of said table at the intake end of said vanes, and a casing enclosing said table.

9. A pulverizer, comprising a bowl-shaped rotary table formed near its axis with holes and having a pulverizing track, vanes carried by the margin of said table constructed for producing upon rotation of the table a current of air, pulverizing members in engagement with said track, a sieve disposed concentrically of said table at the intake end of said vanes, a relatively fixed brush engaging said sieve for cleaning the same, and a casing enclosing said table.

10. A pulverizer, comprising a rotary table formed with a pulverizing track, and having holes near its axis, vanes carried by said table and constructed for producing a current of air from said holes and across said track, pulverizing rollers in engagement with said track, an annular interceptor within said table near the margin thereof, and a casing enclosing the rotary table.

11. A pulverizer, comprising a rotary bowl-shaped table formed with a pulverizing track adapted to rotate with the table and having holes near its axis, vanes carried by said table around the margin thereof above the pulverizing track, and constructed for producing a current of air from said holes and across said track, pulverizing rollers in engagement with said track, and a casing enclosing the rotary table.

In testimony whereof I have affixed my signature.

ERNST CURT LOESCHE.