Dec. 31, 1935. V. MATEJCIK 2,026,426

CUTTER MILL

Filed July 31, 1930 3 Sheets-Sheet 1

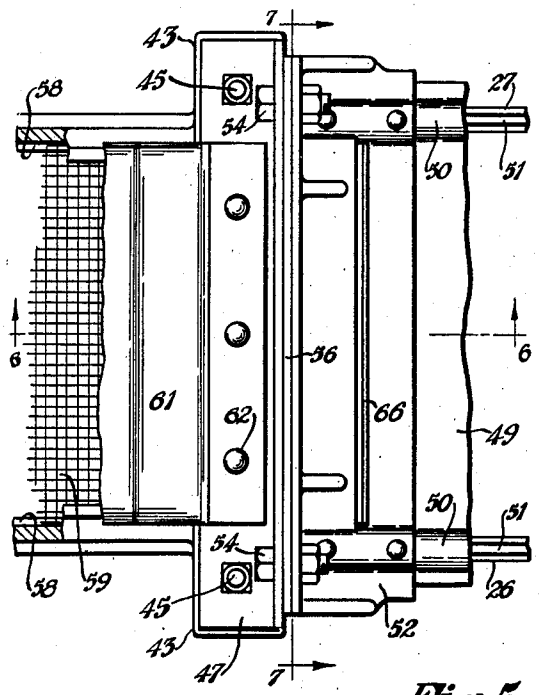



Fig.5

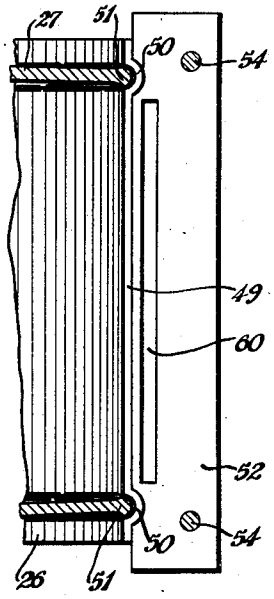



Fig.7

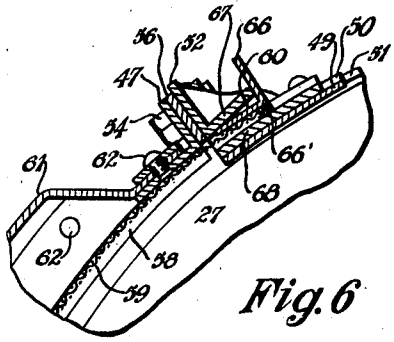



Fig.6

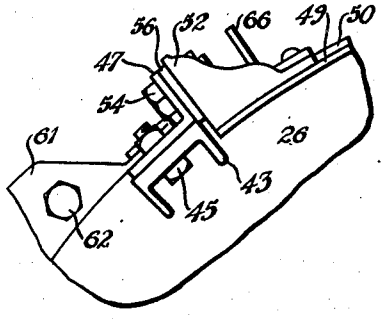



Fig.8

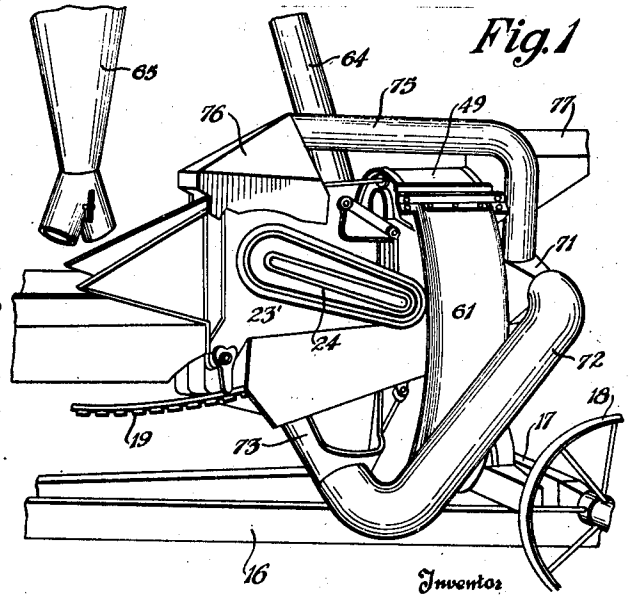



Fig.1

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Dec. 31, 1935. V. MATEJCIK 2,026,426

CUTTER MILL

Filed July 31, 1930 3 Sheets-Sheet 2

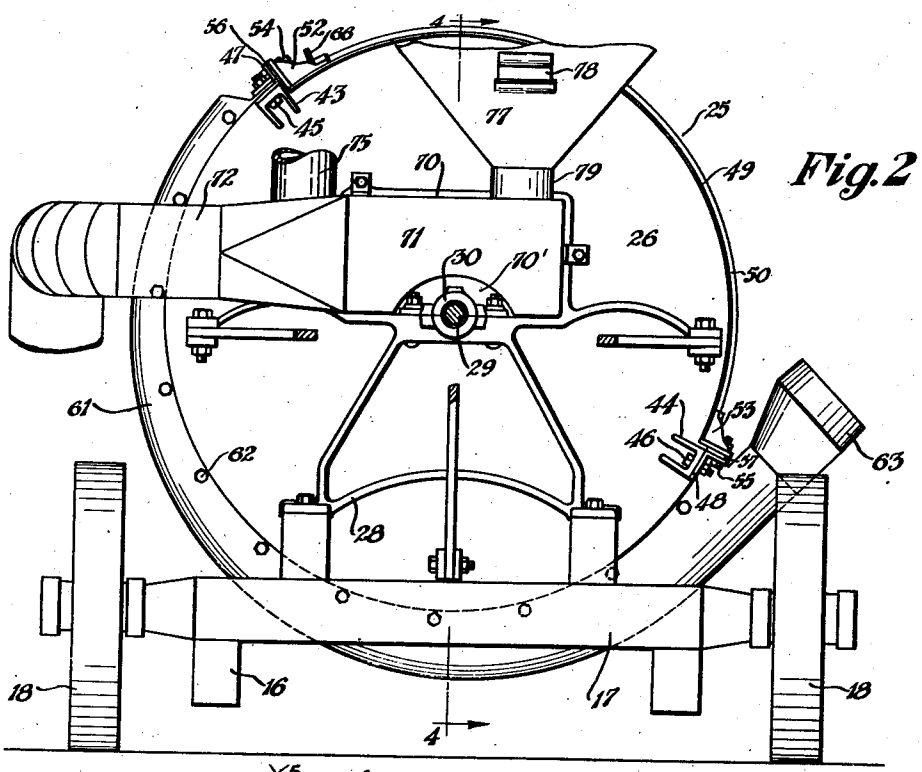


Fig. 2

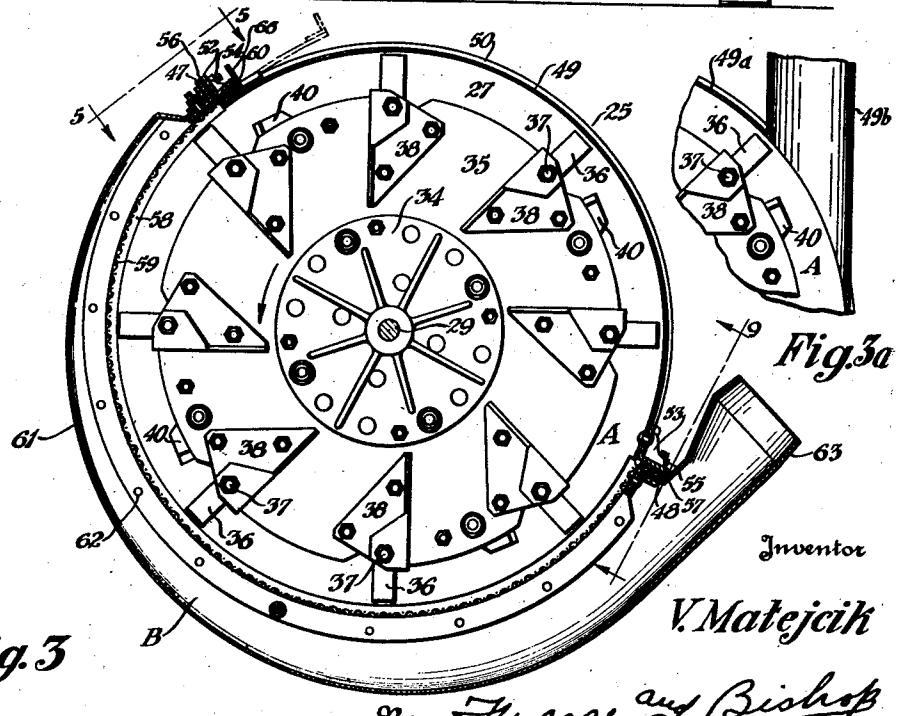


Fig. 3



Fig. 3a

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Dec. 31, 1935. V. MATEJCIK 2,026,426

CUTTER MILL

Filed July 31, 1930 3 Sheets-Sheet 3

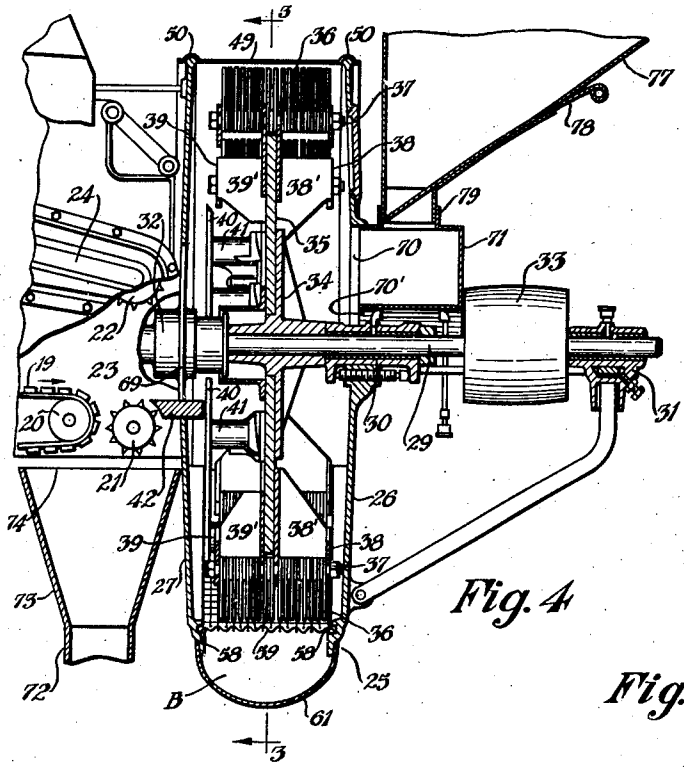


Fig. 4

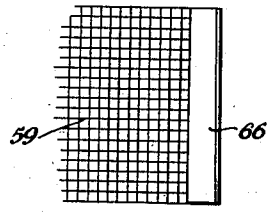


Fig. 12

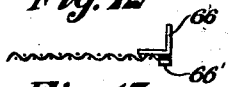


Fig. 13

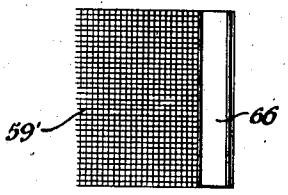


Fig. 14

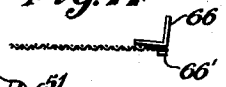


Fig. 15

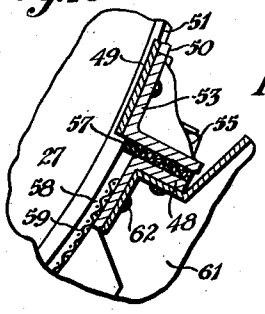


Fig. 10

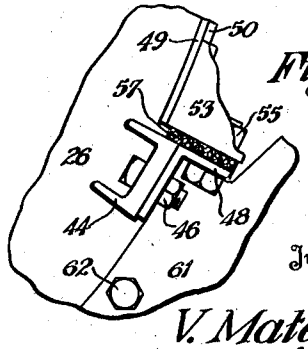


Fig. 11

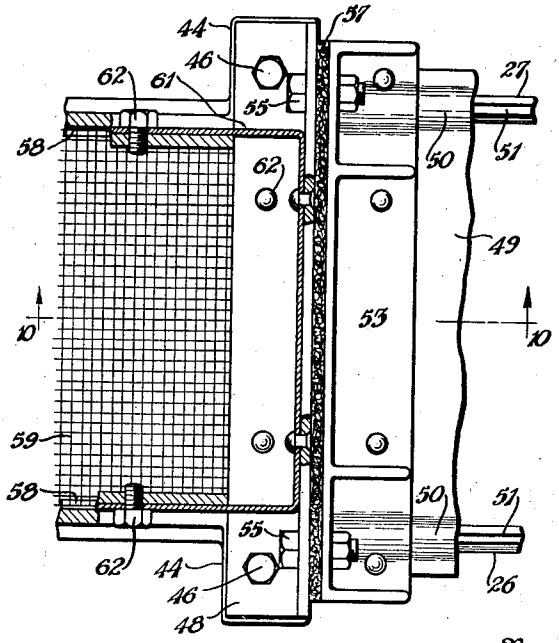


Fig. 9

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# UNITED STATES PATENT OFFICE

2,026,426

## CUTTER MILL

Vincent Matejcik, Canton, Ohio, assignor to Blizzard Manufacturing Company, Canton, Ohio, a corporation of Ohio

Application July 31, 1930, Serial No. 472,038

5 Claims. (Cl. 83—11)

The invention relates to cutter mills and has reference more particularly to an improved construction whereby roughage and/or grain may be cut and ground to any desired size of fineness without discomfort or hazard to the operator.

An improved construction of combined roughage cutter and cutter or grinder mill in which roughage and/or grain may be cut and/or ground to a selected size of fineness by passing the same into a chamber and subjecting it to the grinding action of centrifugal comminuting and blast producing impelling means cooperating with a foraminated plate or screen through which the ground material passes into an exhaust passage after having been reduced to the desired size of fineness, is shown in the Keith Patent No. 1,621,510, dated March 22, 1927.

In prior cutter mill construction the foraminated plate or screen, which determines the size of fineness of material delivered from the mill, cannot be changed when the mill is operating and cannot be quickly or easily changed when the mill is shut down, for replacing the foraminated plate or screen with another having either larger or smaller openings for delivering either coarser or finer material from the mill.

Moreover, prior cutter mill construction requires the use of bolts or other fastening means for securing the foraminated plate or screen in position to form a wall of the fan chamber.

One of the objects of the present improvements is to provide a cutter mill construction in which foraminated plates or screens provided with openings of different sizes may be readily, quickly and easily changed or replaced, one for another, without slowing down or stopping the operation of the centrifugal impelling means.

It is a further object of the present improvements to provide a screen construction which does not require the use of bolts or other positive fastening means to hold the screen in place during operation of the mill.

In feeding roughage into a cutter or grinder mill for reducing the same to finely divided sizes, dust containing minute particles of dried roughage is raised by the feed rolls adjacent the receiving opening of the mill casing, which contaminates the atmosphere adjacent to and surrounding the operating mill. This dust causes extreme irritation to the eyes, ears, nose, throat and lungs of the operators or other persons who are in close proximity to the operating mill.

And finally, it is in an object of the present improvements to provide a hood, litter box and conveyor duct construction for the mill which will collect the dust raised by the feed rolls, and the particles of litter dropping from the feed rolls for conveying the same to the fan chamber and exhaust passage, for preventing contamination of the atmosphere surrounding the mill, and for preventing irritation of and physical injuries to body parts of the operator or other person, preferably by utilizing the suction set up by the centrifugal blast producing means at an air intake orifice of the grinding chamber.

These and other objects may be obtained by a construction, a preferred embodiment of which is shown in the drawings and is hereinafter set forth in detail, which may be stated in general terms as including in a material reducing device, a casing having openings formed in its side walls for receiving material to be reduced and having a peripheral outer wall, an endwise replaceable foraminous peripheral screen or plate forming with said outer wall an arcuate exhaust passage for delivering reduced material, centrifugal comminuting and blast producing impelling means in the casing rotating in the direction of discharge for reducing the material by impact and driving a blast of air carrying comminuted material through the peripheral screen and the arcuate exhaust passage; and means enclosing certain air spaces adjacent one of said material receiving openings communicating with another opening in one of the side walls for conveying dust and litter produced by operation of the device back to the casing by the suction created at said other opening by the centrifugal blast producing means.

A preferred embodiment of the invention is shown in the accompanying drawings, in which

Figure 1 is a fragmentary perspective view of an improved cutter mill;

Fig. 2 is an end elevation, with certain parts in section, of the improved cutter mill;

Fig. 3 is a section through the cutter mill casing taken on the line 3—3, Fig. 4;

Fig. 3a is a fragmentary section through the cutter mill casing showing the same adapted for operating as a fodder cutter;

Fig. 4 is a fragmentary sectional view through the cutter mill casing taken on the line 4—4, Fig. 2, parts of the feed mechanism being shown in elevation;

Fig. 5 is a fragmentary plan elevation of the cutter mill casing looking in the direction of the lines 5—5, Fig. 3;

Fig. 6 is a section taken as on the line 6—6, Fig. 5 located in normal position;

Fig. 7 is a section taken on the line 7—7, Fig. 5;

Fig. 8 is a fragmentary side elevation of the cutter mill casing parts shown in Fig. 5 located in normal position;

Fig. 9 is a fragmentary plan sectional view of the cutter mill casing taken on the line 9—9, Fig. 3;

Fig. 10 is a section taken on the line 10—10, Fig. 9, located in normal position;

Fig. 11 is a fragmentary side elevation of the cutter mill casing parts shown in Fig. 9 located in normal position;

Fig. 12 is a fragmentary plan view of one end of a replaceable foraminous screen having openings of one size;

Fig. 13 is a fragmentary side elevation of the screen shown in Fig. 12;

Fig. 14 is a fragmentary plan view of one end of a replaceable foraminous screen having openings of another size; and

Fig. 15 is a fragmentary elevation of the screen shown in Fig. 14.

Similar numerals refer to similar parts throughout the drawings.

The improved cutter mill is shown generally in Fig. 1 and includes the framework 16, which is mounted in a well known manner on suitable axles and wheels, one axle 17, and wheels 18 therefor being shown. The framework 16 supports the cutter mill mechanism which may include a roughage conveyor 19, driven by the roller 20, and moving in the direction of the arrow shown in Fig. 4.

A lower feed roller 21 and upper feed roller 22 are journaled in a well known manner in the feed mechanism side plates 23 and 23' and are driven by suitable driving mechanism (not shown) contained within the drive mechanism gear case 24.

The cutter mill housing or casing generally indicated at 25, preferably includes side plates 26 and 27, mounted by suitable brackets 28 on the axle 17 and framework 16. A cutter mill drive shaft 29 is journaled in bearings 30, 31 and 32 and has fastened thereon a suitable drive pulley 33 which may be rotated in any well known manner for rotating the drive shaft 29 in the direction shown by the arrow in Fig. 3.

A disk plate 34 secured to the drive shaft 29 is located thereon intermediate the side plates 26 and 27. A larger cutter blade mounting disk plate 35 is carried by the disk plate 34 and mounts a plurality of sets of hammers 36, journaled at 37, on the brackets 38 and 39 carried by the mounting plate 35.

A plurality of knives 40 are mounted at 41 on the mounting plate 35 and cooperate with the shear plate 42 in a manner which will be later described.

Each side plate 26 and 27 has an upper lug 43 and a lower lug 44 projecting integrally outwardly therefrom as best shown in Figs. 2, 8 and 11, to which are bolted, at 45 and 46, the upper angled spacer bar 47, and lower angled spacer bar 48, which maintain the side plates 26 and 27 in the desired spaced relation.

A cylindrically shaped plate 49, presenting a smooth inner surface and provided with edge grooves 50 which engage the semi-hexagonally shaped peripheral edges 51 of the side plates 26 and 27, is provided at its end portions with an upper angled clamp bar 52, and a lower angled clamp bar 53, which are bolted at 54 and 55 to the upper and lower spacer bars 47 and 48, respectively. Sealing gaskets 56 and 57 are preferably interposed between the brackets 47 and 52, and 48 and 53, respectively.

Each side plate 26 and 27 is provided with an annular groove or track 58, on its inner surface adjacent that portion of its peripheral edge opposite the location of the cylindrically shaped plate 49 and extending from the clamp bar 52 downward and around to the clamp bar 53. The grooves 58 form a guideway and track for receiving and guiding the edges of a foraminated plate or screen 59, which may be endwise inserted into the edge tracks through the elongated opening 60, provided in the clamp bar 52 as well shown in Fig. 3; so that the foraminated plate or screen 59 extends around the periphery of the side plates 26 and 27, from the clamp plate 52 to the clamp plate 53.

The side plates 26 and 27, the cylindric plate 49, and the foraminated plate 59 thus form what may be termed a fan chamber, indicated at A, in which the portions 38' and 39' of the brackets 38 and 39 operate as fan blades for inducing an air blast therein upon rotation of the shaft 29.

A preferably crescent shaped sheet metal housing 61 is bolted or riveted to the side plates 26 and 27, and to the spacer bars 47 and 48, at 62, and surrounds the foraminated plate 59, to form an exhaust chamber B, communicating with the fan chamber A through the apertures or openings in the foraminated plate or screen 59.

The sheet metal housing 61 which forms the exhaust chamber B terminates in a tangential tubular discharge outlet 63 which is connected with a pipe 64 which leads to any suitable storage bin or to an air separator 65 when the device is operating as a cutter mill.

The foraminated plate 59 may be made from a wire mesh screen having openings of the size shown in Figs. 5, 9 and 12, or may be a wire mesh screen 59' having openings of a finer size or mesh such as shown in Fig. 14. Any number of screens having openings of different sizes either larger or smaller than those shown in Figs. 12 and 14 may be supplied with each cutter mill.

Each screen 59 or 59' preferably has an angled bracket 66 and a cross bar 66' secured to its end to form a wedge stop and seal, for engagement with the walls 67 and 68 forming the slotted opening 60 in the clamp bar 52, when the foraminated plate 59 has been introduced through the opening 60, along the track 58 and to the position shown in Fig. 3 of the drawings.

The angled bracket 66 also provides means which may be grasped by the cutter mill operator for withdrawing the foraminated plate through the opening 60, as indicated in dot-dash lines in Fig. 3, so that the same may be replaced by another plate having openings therein of a different size of fineness or coarseness without stopping the operation of the mill.

The side plate 27 is provided with an opening 69 adjacent the feed rolls 21 and 22, the path of the knives carried by the plate 35, and the shear plate 42, through which roughage may be fed into the fan chamber A of the cutter mill casing 25.

The side plate 26 is provided with a substantially centrally located air intake opening 70 which is partly enclosed by the suction box 71 and which communicates through a pipe 72 with a litter box or hopper 73 whose open mouth 74 is located directly under the feed roll 21 and conveyor drive roll 20. A pipe 75 also leads from the suction box 71 to a dust hood 76 located above

the upper feed roll 22 and feed mechanism side plates 23 and 23'.

A grain hopper 77, provided with a valve 78, also communicates at 79 with the suction box 71 for a purpose which will be hereinafter described. The portion of the air intake opening 70 provided in the side plate 26 which is not enclosed by the suction box 71 is indicated at 70' in Figs. 2 and 4 of the drawings, and forms a direct entrance for air to be sucked into the fan chamber A.

Let it be assumed that the parts are assembled as shown and described, that the disks 34 and 35 with the attached knives 40, hammer bars 36 and fan blades 38' and 39' are rotated at the proper speed in the direction of the arrow shown in Fig. 3, and that roughage is fed through the feed opening 69 by the feed conveyor 19 and feed rolls 21 and 22.

The knives 40 cooperating with the shear plate 42 cut the roughage as it enters the feed opening 69 over the shear plate 42, and the cut roughage is thrown outward in the fan chamber A by the blast produced by the centrifugal impelling means or fan blades. The material is impinged and reduced by the hammer bars 36 until its size has been reduced to small particles. The blast then carries these small particles through the openings in the foraminated plate, into the exhaust chamber B, and then through the pipe 64 to any desired place of storage or to the air separator 65.

It may be desired to grind grain in the cutter mill, and this may be accomplished by filling the grain hopper 77 with grain, which, upon opening the valve 78, is drawn into the fan chamber A through the suction box 71 by the suction created by the centrifugal fan blades 38' and 39' upon rotation of the shaft 29.

The grain sucked into the fan chamber is thrown outward in the fan chamber, whereupon the material is impinged and reduced by the hammer bars 36 until its size has been reduced to particles sufficiently small enough to pass through the openings in the foraminated plate and into the exhaust chamber B, whereupon the blast created by the fan and the entrained particles pass through the pipe 64 and to any desired place of storage or to the air separator 65.

Oftentimes it may be desired to grind balanced mixtures of roughage and grain which may be accomplished by coincidentally feeding roughage to the fan chamber A through the opening 69 in the side plate 27, and grain to the fan chamber A through the opening 70 in the side plate 26. The amounts of grain and roughage fed to the fan chamber may be controlled by the operator to obtain any desired resulting balanced mixture of comminuted material.

It may be frequently desired to change the degree of fineness to which the reduced roughage and/or grain is to be ground, and this is readily and quickly accomplished by withdrawing the foraminated plate 59 from its track or guideways 58 without stopping the rotation of the centrifugal blast producing impelling means, and introducing another foraminated plate having different sized openings into the track or guideways 58, as indicated diagrammatically in Fig. 3 by dot-dash lines.

Thus, the foraminated plate may be changed without stopping the operation of the cutter mill, and no bolts or other positive fastening means are required for holding the foraminated plate in place, the only forces acting upon the same tending to draw it more tightly to its operative position.

The suction created in the suction box 71 by operation of the blast producing centrifugal impelling means creates a suction in the pipes 72 and 75, leading respectively to the litter box hopper 73 and the dust hood 76. When certain types of roughage are fed to the fan chamber A, an injurious dust is raised at and adjacent the feed rolls 21 and 22 which is sucked into the dust hood 76 enclosing an air space above the feed rolls. This dust then passes into the fan chamber through the suction box 71 without any injurious effects upon the operator.

Likewise any litter which may drop from the roughage at and adjacent the feed roll 21 is caught in the litter box 73, drawn to the suction chamber 71, and introduced into the fan chamber A, thus avoiding a waste of material being ground.

The cutter mill may be readily, quickly and easily operated as an ordinary fodder cutter by replacing the foraminated plate 59 with an imperforate plate, and by replacing the cylindrically shaped plate 49 with a plate 49*a* having a vertically disposed discharge opening 49*b* therein as shown in Fig. 3*a* of the drawings.

The blast created within the fan chamber A is not only sufficient to carry out all of the purposes described, but is also sufficient to keep the openings in the foraminated plate 59 open at all times by the action of the entrained particles of reduced material driven through the openings by the blast. The capacity of the cutter mill is therefore always constant for any given material being reduced, for any given speed of rotation of the shaft 29, and for a selected foraminated plate having certain sized openings.

Moreover, the cutter mill grinds and delivers reduced material through the delivery pipe 64 without the use of any additional blower fans placed in the delivery line leading from the exhaust chamber B.

I claim:

1. In a material reducing device, a casing including side walls, spacer bars connected to the side walls, an imperforate plate peripheral wall portion having clamping bars at its ends connected to the spacer bars, the side walls being provided with arcuate guideways, there being an opening formed in one of the clamping bars communicating with the arcuate guideways, a foraminous screen plate peripheral wall portion entered through the opening and along the arcuate guideways to complete the formation of the casing, centrifugal comminuting and blast producing impelling means rotating in the chamber for reducing by impact material introduced therein, and means on one end of the foraminous plate for sealing the opening when the foraminous plate is in position completing the formation of the casing.

2. In a material reducing device, a casing having material receiving openings formed in opposite side walls thereof, centrifugal comminuting and blast producing impelling means in the casing for reducing material by impact, and means enclosing an air space above one of the material receiving openings and communicating with an opposite material receiving opening for conveying dust produced by operation of the device back to the casing by the suction created at the last mentioned opening by the centrifugal blast producing means.

3. In a material reducing device, a casing hav-

ing openings formed in its side walls for receiving material to be reduced and having a foraminated peripheral outer wall, there being an exhaust passage communicating with the foraminated wall, means for feeding material to the casing through one of the receiving openings, a suction box enclosing another material receiving opening, means enclosing an air space above the first mentioned material receiving opening and communicating with the suction box, and centrifugal comminuting and blast producing impelling means in the casing for reducing material by impact, creating a suction in the suction box and the means communicating therewith, and driving a blast of air carrying comminuted material through the foraminated wall and exhaust passage.

4. In a material reducing device, a casing having openings formed in its side walls for receiving material to be reduced and having a foraminated peripheral outer wall, there being an exhaust passage communicating with the foraminated wall, means for feeding material to the casing through one of the receiving openings, a suction box enclosing another material receiving opening, means enclosing an air space adjacent one of the material receiving openings communicating with the suction box, a grain hopper communicating with the suction box, and centrifugal comminuting and blast producing impelling means in the casing for reducing material by impact, creating a suction in the suction box and the means and grain hopper communicating therewith, and driving a blast of air carrying comminuted material through the foraminated wall and exhaust passage.

5. In a material reducing device, a casing having openings formed in its side walls for receiving material to be reduced and having a peripheral outer wall, a foraminous peripheral screen forming with the outer wall an arcuate exhaust passage for delivering reduced material, centrifugal comminuting and blast producing impelling means in the casing rotating in the direction of discharge for reducing the material by impact and driving a blast of air carrying comminuted material through the peripheral screen and the arcuate exhaust passage, and means enclosing an air space above one of the material receiving openings and communicating with another material receiving opening for conveying dust produced by operation of the device back to the casing by the suction created at the last mentioned opening by the centrifugal blast producing means.

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