

Dec. 10, 1940.

H. J. MANKOFF

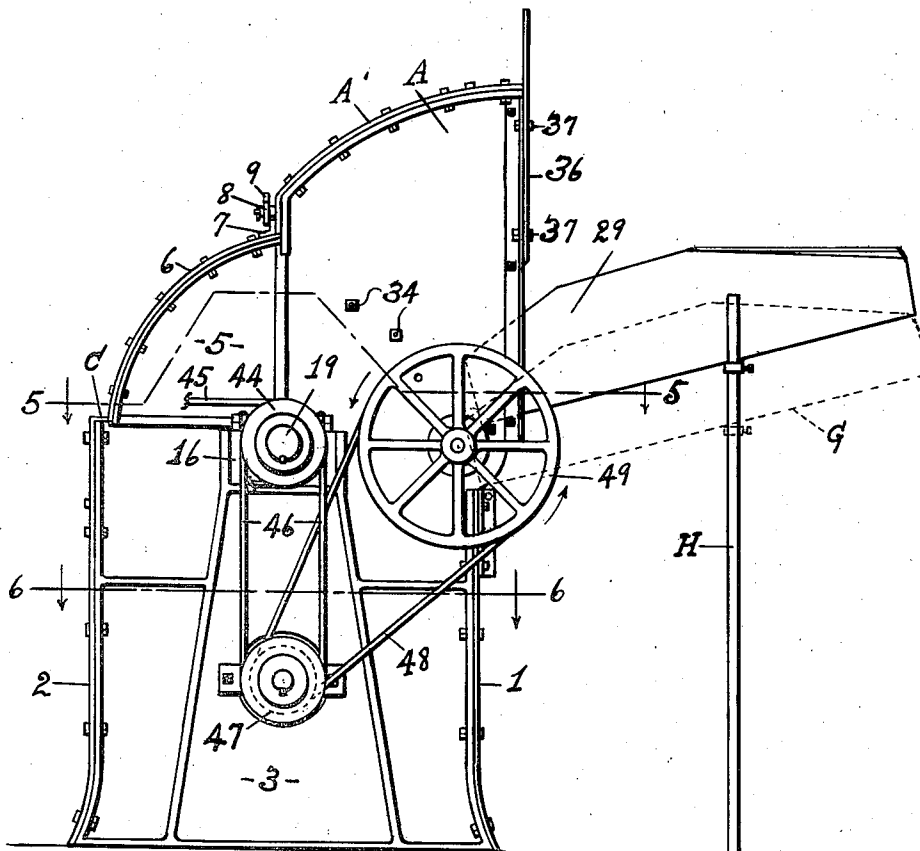
2,224,442

GRINDING MACHINE

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4 Sheets-Sheet 1

Fig. 1



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Fig. 2

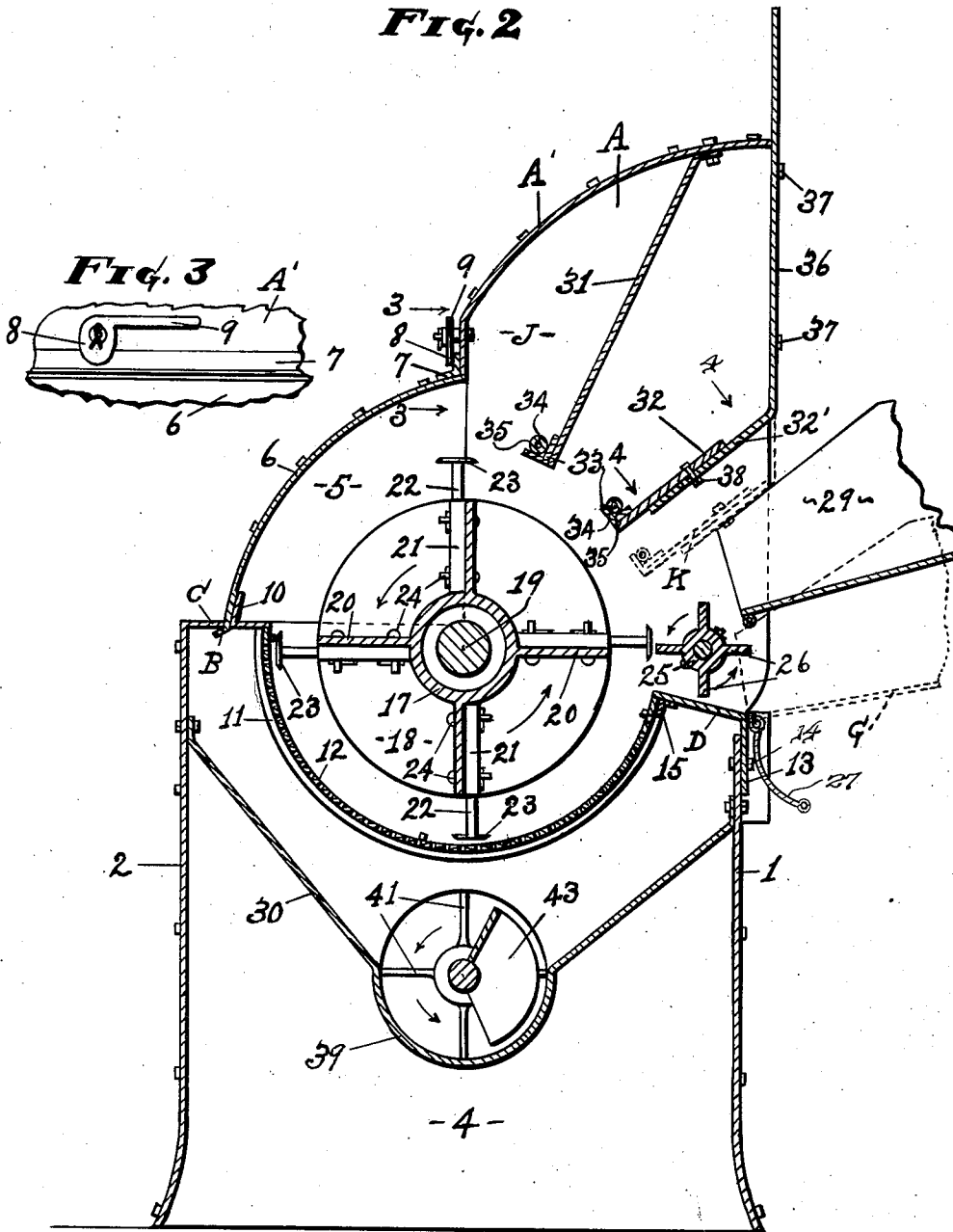
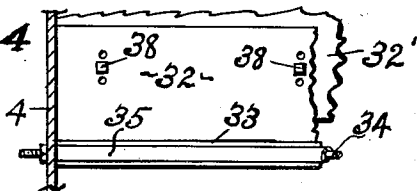


Fig. 4



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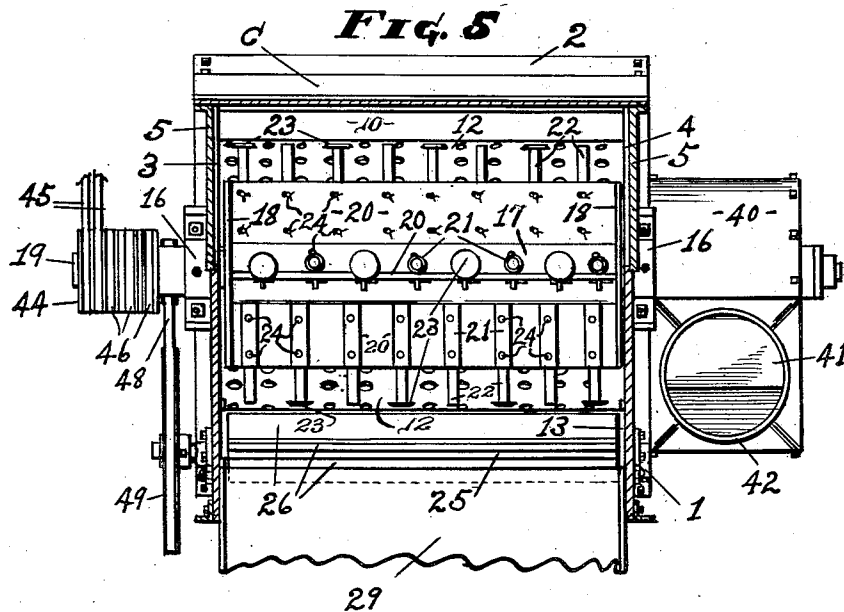
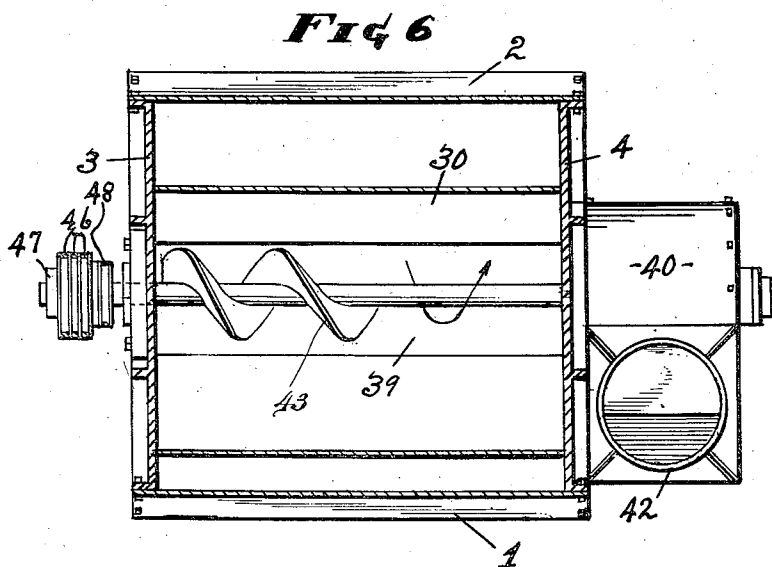
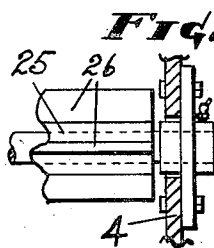
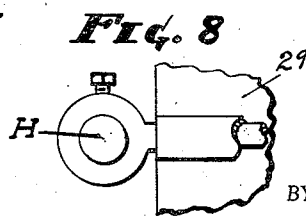
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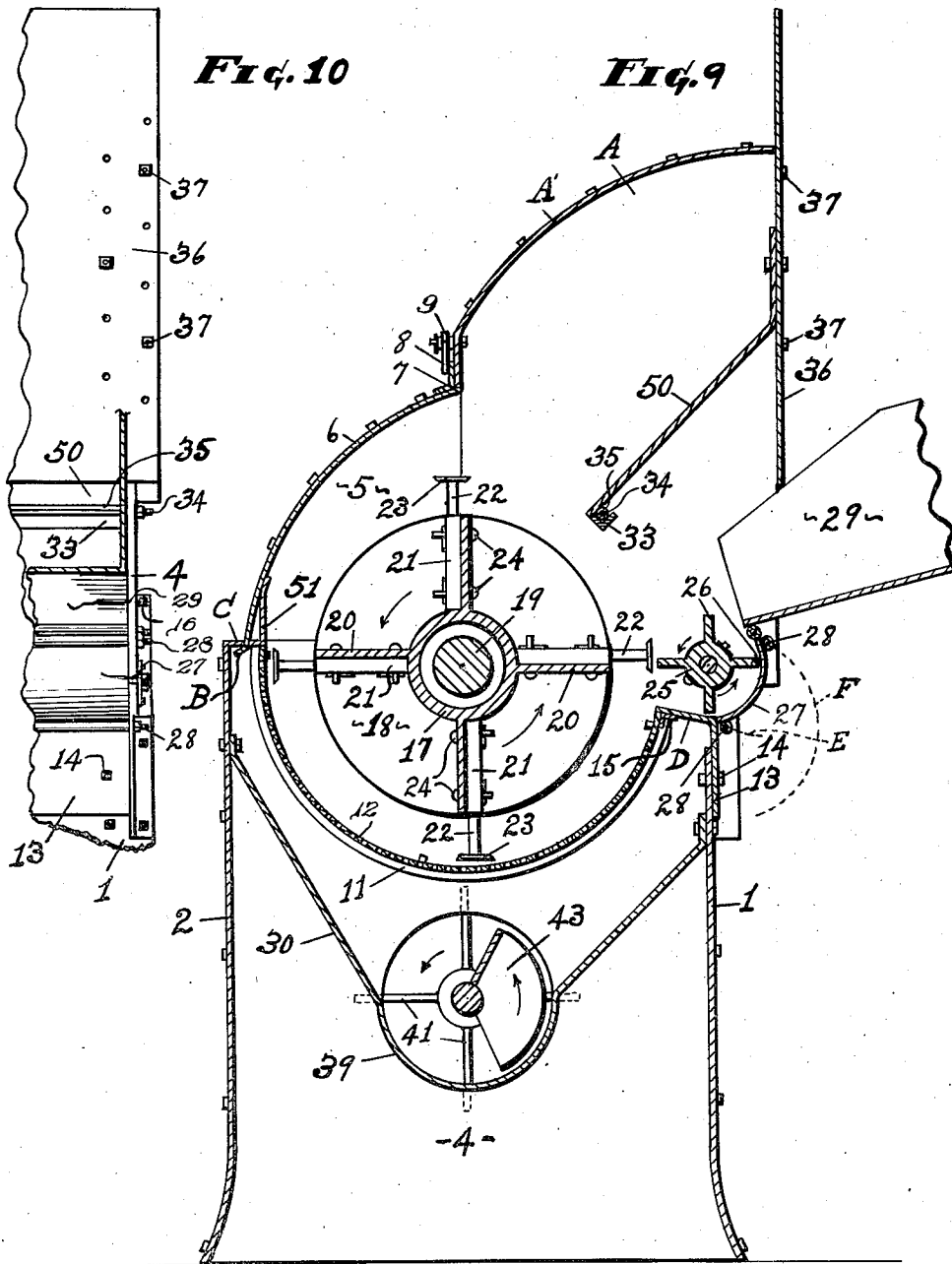
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4 Sheets-Sheet 4



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GRINDING MACHINE

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Application January 30, 1939, Serial No. 253,548

5 Claims. (Cl. 83-11)

An object of my invention is to provide an efficient retarding means through the medium of a baffle for substance at the instant of feeding the same into the grinding cylinder of the machine, and other similar succeeding baffles in spaced relation, all being between the feed mouth of the machine and the vertical radii of the axis on which the cylinder turns, by which means the substance is preground step by step prior to encircling the cylinder in its high velocity of rotation, and the said substance unpulverized will be returned for like treatment repeatedly, and being thrown by centrifugal force between the baffle plates for a direct return radially to the cylinder, whereby the substance from the baffles is substantially free of rotary movement with the cylinder.

A further object of my invention is to provide an efficient rotatable means for the discharge of screenings from the substance pulverized during its course of treatment; for example, the husks from oat grains will not pulverize under normal treatment by the machine; consequently, said husks or like substance are discharged by centrifugal force into said means from whence it is removed from the grinding cavity, and the said means functioning as an auxiliary feed, and having means for the return of comminuted substance to the cylinder.

A still further object of my invention is to provide a hopper for the reception of the pulverized substance, and an efficient means coacting with a fan to avoid congestion of said substance in the hopper as sifted therein.

A still further object of my invention is to provide a feed grinding machine having a hood, a portion of which is integrally joined to the housing and having baffles positioned therein to receive and retain preground substance temporarily and permit the same to return to the grinding cylinder of the machine repeatedly until comminuted or reduced to a pulverized state, the other portion of the hood being removable as accessible means to the grinding cavity.

A still further object of my invention is to provide an adjustable, vertically disposed plate to close the front of the stationary portion of the hood, the lower portion of said plate obliquely extending toward the axis of the grinding cylinder to carry a baffle adjustably thereon, functioning as the first upper baffle at the feed mouth.

A still further object of my invention is to utilize the rotatable baffle as a means to return certain substance checked thereby into the feed

table when said table is positioned below the wing arc of the rotatable baffle.

These and other objects will hereinafter be more fully explained, reference being had to the accompanying drawings forming a part of this specification, and in which like characters will apply to like parts in the different views.

Referring to the drawings:

Fig. 1 is a side elevation of the grinding machine.

Fig. 2 is a vertical section through said machine.

Fig. 3 is a fragmentary view of the rear of the machine, showing the locking means for the removable portion of the hood, looking in the direction of the arrows 3-3 in Fig. 2.

Fig. 4 is a plan view of one of the baffle plates, looking in direction of the arrows 4-4 in Fig. 2.

Fig. 5 is a sectional view taken on line 5-5 in Fig. 1 looking in the direction of the arrows.

Fig. 6 is a sectional view taken on line 6-6 in Fig. 1.

Fig. 7 is an enlarged fragmentary view of the bearing and the adjacent end portion of the rotatable feed and baffle element.

Fig. 8 is an enlarged fragmentary view of the rod and eye through which the feed table supporting leg engages.

Fig. 9 is a sectional view similar to Fig. 2, showing a modification of the front closing plate of the hood, the grinding housing, and plate closing means for the rotatable feed and baffle element.

Fig. 10 is a fragmentary front elevation of Fig. 9.

The grinding machine herein disclosed consists of a housing having front 1, rear 2 and side walls 3 and 4 respectively. A portion of each side wall extends upward as at A, and has an arcuate top A' connecting the same, functioning as the front portion of the hood for the purpose later described. The rear portion of the hood is removable, consisting of end walls 5 and an arcuate top 6 connecting said walls, said arcuate portion having a flange B turned outward along the lower edge thereof to interlock with an intumed portion C of wall 2, while the upper edge has an L-shaped member 7 secured thereto and adapted to engage closely with the lower marginal portion of top member A', and being secured thereto by a latch 8 pivotally carried by said top A', the latch adapted to engage upon the upper leg of member 7, binding the same to snug engagement with the said marginal portion, and the said latch 8 has an arm 9 inte-

grally joined as rocking means for the latch to and from engagement; the said rear portion of the hood, being so arranged, permits access to the grinding cavity. The said removable portion 5 of the hood has an L-shaped member 10, secured to the bottom adjacent its flange B in such a way that the horizontally disposed leg thereof will extend inward over the ends of arcuate shoulders 11, there being one shoulder integrally joined 10 to each of said side walls 3 and 4 respectively, said shoulders extending inward toward each other as a seat for the ends of a perforated plate 12, said plate functioning as a sieve or bolting screen, and being secured by one side abutting 15 the over extension of the leg of said member 11, while the other side of the plate abuts the overlapped edge of an inturned portion D of a plate 13 that is secured to said front wall I by bolts 14, the inturned portion being reinforced by an L-shaped member 15 secured thereto, and against 20 which the marginal edge of said plate will engage. The said perforated plate, being thus seated and secured, may be withdrawn by removing the removable portion of the hood.

25 Trunnioned in the housing by suitable bearings 16 is a grinding cylinder consisting of a sleeve 17 having a head 18 secured to each end thereof, and a shaft 19 centrally passing through the sleeve and heads is the journal for the cylinder, and ro- 30 tatable therewith. The sleeve has a plurality of blades 20 radially positioned, extending from head to head, and being secured to each thereof. Each blade has a plurality of pipes 21 secured to and spaced therealong, said pipes transversely 35 crossing their respective blades, and in which are positioned the shanks of hammers 22, said hammers varying in construction and alternately positioned in the pipes, one set of which has discs 23 on the outer ends thereof as a cutting element 40 for the grinding cylinder, while the other hammers are a plain cylindrical element, each end of which is cut at right angles to the body portion, and may be reversed with respect to end engagement, while the discs may be reversed by a turn 45 through an arc of 180 degrees, each shank portion being secured in its respective pipe by bolts 24. The said discs may be beveled on either side when sharpening the same, as the case may require, for rapid or slow feeding.

50 Trunnioned in the housing at the lower extremity of its feed mouth of the cylinder is a rotatable baffle to assist in feeding, also to eject coarsely comminuted substance from the machine, said baffle consisting of a body portion 55 25 having radially extending blades 26, the blades to engage in close proximity to the inturned portion D of plate 13, and the outer edges of the blades also to engage closely to the outer ends of the cylinder hammers, against which substance 60 being ground will contact, it being understood that the said cylinder and rotatable baffle turn in the same direction, but being so arranged that the edge of the blades and ends of the hammers will move oppositely, to increase the contact force 65 and, furthermore, to eject screenings from the grinding cavity. To avoid such ejection, as above stated, I have arranged an arcuate plate 27 that is pivotally carried at each side thereof by rods 28 respectively, the edges of the plate being 70 looped therearound, or a sleeve welded thereto, through which said rods will extend. Being so arranged, the plate may swing from either side as shown by dotted lines E or F selectively by removing one of said rods when ejection is preferred.

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The said grinding machine has a feed table 29 that is adjustable and may be attached below said rotatable baffle as shown in Fig. 2 by dotted lines G, said table being supported by a pair of legs H adjustably and rockably carried at the under- 5 side of said table substantially as shown. When the table is positioned as shown by dotted lines G, the said rotatable baffle may function as a return for unpulverized substance to said feed table for a repeated run through the machine; 10 furthermore, the feed table, when placed upward as shown in Fig. 2, is the preferred position when grinding threshed grain, the husks therefrom being ejected as thrown into the blades of the ro- 15 tatable baffle, beneath the bottom of feed table; furthermore, the feed table thus positioned is a means to produce two grades of grinding, namely, pulverized and coarsely comminuted substance from alfalfa, or the like, the pulverized 20 substance passing through the screen into hopper 30 that is carried by the housing beneath said perforated plate, while the coarse comminution will be discharged outward of the housing by the rotating movement of said rotatable baffle.

As a means to insure rapid and thorough grind- 25 ing of hay, or the like, fed into the machine, there is positioned a pair of baffle plates 31 and 32, each of which are radially positioned with respect to the axis of the grinding cylinder, and being housed within the stationary portion of the hood 30 in such a way that the inner edges of each are positioned in close proximity to the outer ends of the grinding hammers for best result, cutting the hay, the particles of which may be 35 thrown between said baffles or between the inner baffle and the hood adjacent thereto as at J by the blast of the cylinder blades. Being so filled, the substance will gradually return in contact with the grinding cylinder which turns with high velocity. The first deposit between said baffles is 40 the pregrinding of the substance, and being further ground as it moves outward from the baffles, and from thence in contact with the perforated plate by centrifugal force of the grinding cylinder, pulverizing the same. The portion unpul- 45 verized will be conducted to a repeated treatment at the baffle edges, including the rotatable baffle.

It will be understood that an excess discharge of the ground substance from the feeding mouth 50 of the machine will be counteracted to a great extent by the fan blast, conveying the pulverized or finely comminuted substance from the hopper, and in conjunction therewith. The feeding mouth will be well filled with the material that 55 continuously moves into the grinder to assist the said counteractive principle.

It will be seen that the inner edges of the baffle plates are provided with an L-shaped member 33, extending therealong, the ends of which abut 60 snugly with the sides of the hood, and each being secured by its respective bolts 34 that extend through a sleeve 35 that is secured to said L-shaped members; being so arranged that the rods draw the sides of the mill inward by nuts 65 threadedly engaging on the bolts.

The body of baffle plate 32 is carried by an obliquely inturned portion 32' of a plate 36 as closing means for the front of said hood, and the said plate may be raised or lowered as the case 70 may require, and being secured by bolts 37. The said body portion of baffle plate 32 is adjustably secured by bolts 38 as said plate 36 is raised or lowered; furthermore, the said last plate and baffle may be dropped and secured at a position 75

shown by dotted lines K in Fig. 2, by which means the mouth opening is reduced, as the case may require.

The hopper above referred to has a semicircular trough 39 at its lower extremity, communicating with a fan housing 40 in which a fan 41 is positioned as discharging means for the contents of the hopper outward through a pipe 42 that leads to a place of deposit.

To avoid a compact choke condition in the hopper there is placed in the trough a worm conveyor 43 that extends a short distance from the side of the housing opposite the fan, by which means pulverized or finely comminuted substance will be stirred and moved toward the fan opening.

In Fig. 1 is shown the belt hookup for power transmission, consisting of pulley 44 having belt means 45 to connect the same with a motor as turning means for the grinding cylinder (the motor not being shown in the drawings). The said pulley 44 has belts 46 connecting to a pulley 47 as turning means for the fan and conveyor, and another belt 48 extending therefrom to engage on a pulley 49 as turning means for the said rotatable baffle, said last pulley being increased in diameter over its driving pulley as speed reducing means for the said baffle, all of said pulleys having suitable shaft and bearings for their respective service. Furthermore, the belts above referred to are preferably of the V-type to engage in grooves of the pulleys.

In Figs. 9 and 10 is shown a modification for the connection of a single baffle 50 in the hood to permit raising and lowering of the front closing plate of said hood, the baffle being in one piece and the reinforcing angle bar being on the underside of the inner edge of the plate to provide a smooth surface along the upper side of the baffle, and the arcuate top of the removable portion of the hood is moved inward at its lower extremity to avoid a shoulder as is shown in Fig. 2. This I accomplish by reversing an unequalled leg shaped member 51, the function of which is the same with respect to contact with the edge of the perforated plate, and such other modification may be employed as lie within the scope of the appended claims.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a feed grinding machine of the class described, the machine comprised of a housing, a hood having a removable vertically disposed plate to close the front of the hood, and a removable rear portion as part of the hood, the removable front carrying a baffle plate adjustably thereon, the plate obliquely extending inward, and other baffle plates carried by the hood in spaced relation inward from the first said baffle plate, said plates converging inward and downward of the housing, said housing having an opening as a feed mouth, said opening extending downward a spaced distance from the lower extremity of said removable plate, a feed table carried in working relation to the opening, a rotatable winged baffle and feeding element trunnioned in the feed opening near the lower extremity thereof, a plate to enclose the baffle externally of the housing, in which case, said baffle will function as a feeder when the feed table is upwardly positioned to the baffle, and the said baffle communicating through the opening as an exit for substance conveyed thereby as the baffle turns when said plate is removed, a hammer grinding cylinder trunnioned in the housing, the outer extremity of the ham-

mers to move in close proximity to the wings of the rotatable baffle and the inner edges of said baffle plates, an arcuate perforated plate circumscribing the lower portion of the grinding cylinder, a hopper spaced downward from said plate, said hopper having an arcuate trough extending across the bottom thereof and integrally joined thereto, a worm conveyor extending a short distance from one end of the trough longitudinally of the trough, an exhaust fan and housing communicating with the trough at the other end, power actuating means for the grinding cylinder which in turn is actuating means to rotate the conveyor and said winged baffle simultaneously, the machine being thus equipped will produce a pulverized feed and a coarsely comminuted feed simultaneously when said plate is removed from the winged baffle, and the varying comminutions, being separately discharged.

2. In a feed grinding machine of the class described, the machine comprised of a housing, a hood having a removable vertically disposed plate to close the front of the hood, the removable front carrying a baffle plate adjustably thereon, said housing having an opening as a feed mouth, said opening extending downward a spaced distance from the lower extremity of said removable plate, a feed table carried in working relation to the opening, a rotatable winged baffle and feeding element trunnioned in the feed opening near the lower extremity thereof, a plate to enclose the baffle external of the housing, in which case, said baffle will function as a feeder when the feed table is upwardly positioned to the baffle, and the said baffle discharging residue from the ground substance through its opening as the baffle turns when the plate is removed, a hammer grinding cylinder trunnioned in the housing, the outer extremity of the hammers to move in close proximity to the wings of the rotatable baffle and the inner edge of the baffle plate, an arcuate perforated plate circumscribing the lower portion of the grinding cylinder, a hopper spaced downward from said plate, said hopper having an arcuate trough extending across the bottom thereof and integrally joined thereto, a worm conveyor extending a short distance from one end of the trough longitudinal of the trough, an exhaust fan and housing communicating with the trough at the other end, power actuating means for the grinding cylinder which in turn is actuating means to rotate the conveyor and said winged baffle simultaneously, the machine being thus equipped will produce a pulverized feed and a coarsely comminuted feed simultaneously when said plate is removed from the winged baffle, the said varying comminutions being separately discharged.

3. A machine of the class described comprising a housing and a hood for the housing, a feed mouth at the juncture of the hood and housing, a grinding cylinder trunnioned in the housing and in working relation to the housing and hood portions, means to rotate the cylinder in such a way as to direct its rotation upwardly and across the feed mouth, a feed table having one end extending through the mouth towards the cylinder, means to support the feed table in working position, a perforated screen element encircling the lower peripheral side of the cylinder, said cylinder having a plurality of radially extending blades, cutting hammers consisting of discs and cylindrical elements secured at intervals along said blades and carried thereby as the cylinder rotates, the sides of the discs being tangentially positioned

with respect to the cylinder circumference, said discs and the outer ends of said cylindrical elements moving in close relation to the inner face of said perforated screen, substance fed into the machine being finely comminuted at said screen and forced therethrough by fan action of the blades, an adjustable baffle plate carried by the hood inwardly thereof, a bar secured to the inner edge of said baffle plate, said bar being spaced a short distance from the outer extremity of the cylinder hammers and constituting means against which substance is preground coarsely by an upper stroke of the hammers and discharged upwardly into the hood to return in shattered form for further grinding to a pulverized state.

4. A machine of the class described comprising a housing and a hood for the housing, a feed mouth at the juncture of the hood and housing, a grinding cylinder trunnioned in the housing and in working relation to the housing and hood portions, means to rotate the cylinder in such a way as to direct its rotation upwardly and across the mouth, a feed table having one end extending through the mouth towards the cylinder, means to support the feed table in working position, the said machine having a perforated screen element encircling the lower peripheral side of the cylinder, the said cylinder having a plurality of radially extending blades, cutting hammers consisting of discs and cylindrical elements alternately positioned along said blades, secured thereto and carried thereby as the cylinder rotates, the sides of the discs being tangentially positioned with respect to the cylinder circumference, said discs and the outer ends of said cylindrical elements moving in close relation to the inner face of the said perforated screen as the cylinder rotates, substance fed into the machine being finely comminuted at said screen and forced therethrough by fan action of the blades, a plate adjustably carried by the hood to vary the width

of the mouth vertically, and a baffle plate carried by said first plate, means to move the inner edge of the baffle plate toward and from the cylinder, by which means substance is preground coarsely against said baffle plate by an upper stroke of the hammers, and discharged upwardly into the hood to return in shattered form for further grinding to a pulverized state.

5. A machine of the class described comprising a housing and a hood for the housing, there being a feed mouth at the juncture of the hood and housing, a grinding cylinder trunnioned in working relation to the housing and hood portions, means to turn the cylinder in such a way as to direct its rotation upwardly and across the mouth, a feed table having sides and bottom, the ends being open, one end extending through the mouth towards the cylinder, means to support the feed table in working position, a perforated screen element encircling the lower peripheral side of the cylinder, said cylinder having a plurality of radially extending blades, cutting hammers consisting of discs and cylindrical elements alternately placed along said blades and in staggered relation to similar hammers on an adjacent blade, the sides of the discs tangentially positioned with respect to the cylinder circumference, said discs and the outer ends of said cylindrical elements moving in close relation to the inner face of the said perforated screen and cooperating therewith, a baffle plate serving as a retarding element for substance fed into the machine, said baffle plate being adjustable to choke or increase the feeding of substance into the cylinder, and serving to prebreak the substance coarsely, and means in the hood to retard continuous movement of the broken particles in rotation with the cylinder and to further pre-grind or break the substance prior to its entering the perforated screen portion for final pulverizing and bolting.

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