April 22, 1941. I. T. MILLER 2,239,197

PULVERIZER

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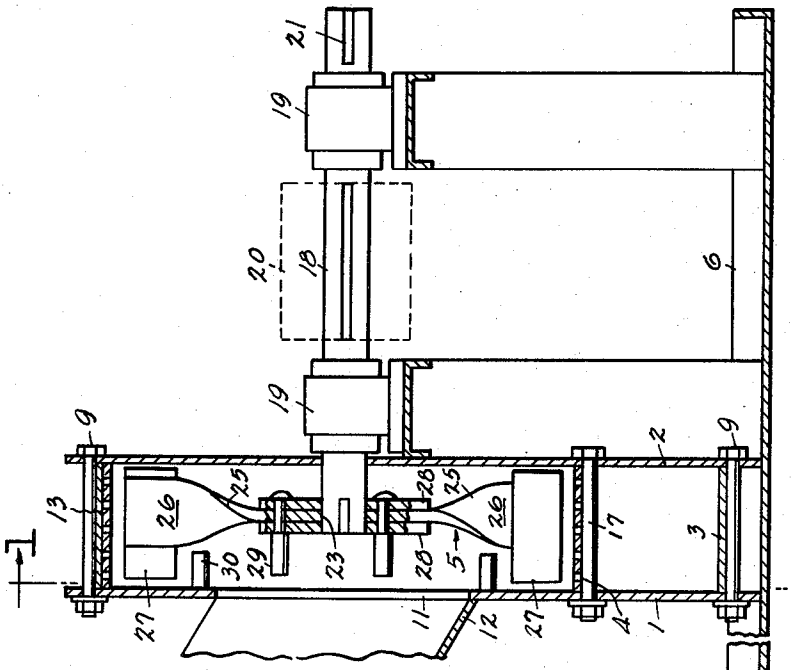


Fig. 2.

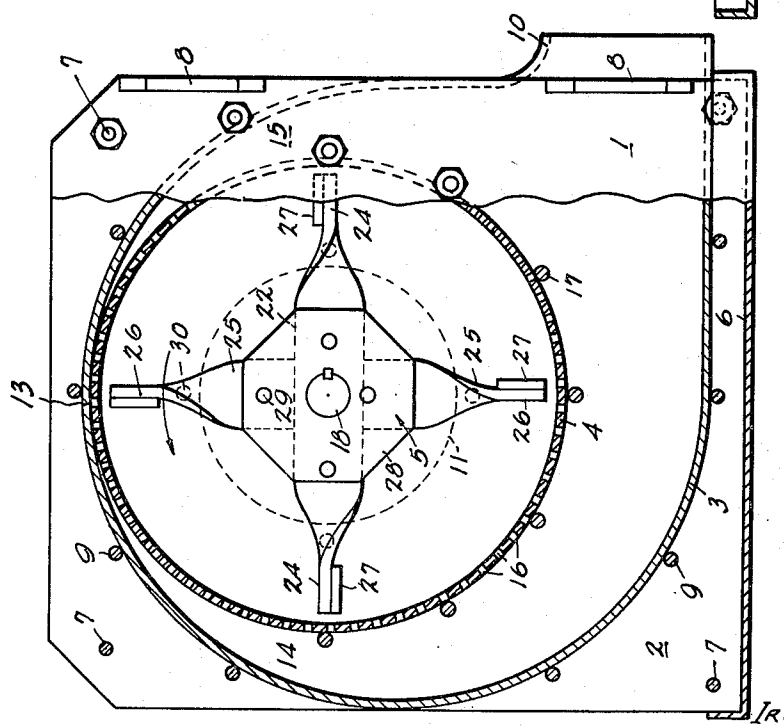


Fig. 1.

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PULVERIZER

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6 Claims. (Cl. 83—11)

The present invention relates to improvements in a pulverizer and has particular reference to a machine for pulverizing alfalfa hay or the like, although it may be used for different purposes.

The principal object of my invention is to provide a machine of the character described which is particularly efficient and economical in operation, simple in construction, and offers various advantages over machines of this type previously used.

More particularly it is proposed to provide a drum type of pulverizer having perforations arranged in such a manner that substantially the entire surface area may be usefully employed for the discharge of material that has been comminuted within the drum.

It is further proposed to arrange the drum in a housing in such a manner that the space about the drum is substantially self-cleaning and the accumulation of dust of comminuted material, as well as the clogging of the drum surface is essentially prevented.

As a further object, I propose to provide a new type of rotor or agitator which is particularly effective in breaking up and comminuting the material and which may be easily and economically constructed.

And finally, it is proposed to provide a machine of the type described in which the formation of a dead pocket is eliminated and the entire space within the housing is utilized for producing an unobstructed flow of air and material carried thereby, in the absence of any eddy currents or other disturbing factors.

Further objects and advantages of my invention will appear as the specification proceeds and the novel features be set forth in the claims hereto appended.

The preferred form of my invention is illustrated in the accompanying drawing forming part of this application, in which

Figure 1 shows a transverse, vertical section through my pulverizer, as seen from line 1—1 of Figure 2, and

Figure 2 is an axial vertical section through the device.

While I have shown only the preferred form of my invention, I wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

Referring to the drawing in detail, my machine comprises in its principal features a pair of spaced vertical plates 1 and 2, a cylindrical shell or housing 3 supported therebetween, a screen drum 4 within the shell and a rotor or agitator 5.

The plates 1 and 2 may be of any suitable form, preferably rectangular and are supported vertically and in spaced relation on a suitable base 6. They are interconnected by bolts 7 preferably arranged in the four corners of the plates. One of the plates is preferably hinged to a vertical support, as at 8, so that it may be swung outwardly, upon removal of the fastening means, to give access to the interior of the machine.

The cylindrical shell or housing 3 is supported between the plates on an annular series of bolts 9 and has a peripheral discharge 10 which is preferably arranged tangent to the periphery of the shell and which may be suitably connected to a cyclone collector. Access is given to the interior of the housing through an opening 11 in plate 1, which connects with a chute 12 sufficiently inclined to allow a bale of hay to slide toward the machine by gravity.

The screen drum 4 is mounted inside of the shell and in eccentric relation thereto. The drum is lifted from concentric position so that its upper portion substantially contacts the inner face of the shell, as at 13. The drum thereby divides the major section of the housing into two chambers 14 and 15, each of which progressively increases in cross-section or width in a downward direction. This latter feature causes the two chambers to be substantially self-cleaning since any material lodging in the chambers would have a natural tendency to gravitate downwardly, particularly if aided by suction at the discharge 10.

The drum is suitably perforated, as at 16, and it should be noted that the perforations extend through the entire periphery of the drum so that practically the entire surface of the drum serves as a screen area and is active in discharging material that has been comminuted sufficiently to pass the screen.

The drum or screen is suitably supported between the plates on cross-bolts 17 and is of sufficient width to cover the entire space between the plates.

The rotor 5 is mounted on a shaft 18 which is supported in spaced bearings 19. This shaft may be rotated by any suitable means, such as, a pulley 20 arranged between the bearings. The shaft may be keyed, as at 21, for direct attachment to a motor, engine or other source of power.

The rotor comprises a number of agitating arms which are preferably assembled as follows: a bar 22 of slightly less length than the diameter of the screen is formed with a central perfora-

tion 23 to fit on the shaft 18 and has its ends twisted to provide transverse blades 24. Two additional bars 25 of shorter length have their inner ends arranged in abutting relation to the central portion of the bar 22 so as to form a cross therewith and have their outer ends twisted to form blades 26 corresponding in position to the blades 24. Each of the blades may have a face member 27 of harder material attached thereto. The abutting portions of the bars are clamped between two plates 28 and are thereby held in assembled relation.

It will be noted that the twist in each bar is arranged with the leading edge near the plate 1 through which the material enters so that each twist has a tendency to work the material toward the rear wall for a more even distribution of the material throughout the screen.

Each of the bars preferably has one or more ripping members 29 projecting therefrom toward the entrance opening, the ripping members serving to tear or rip the hay apart, particularly if it is fed in the form of baled hay or otherwise has a tendency to bunch.

Suitable co-operating ripping members 30 may be provided in the front plate 1 around the opening to aid in breaking and tearing the hay carried forward by the propeller and the ripping members 29. The latter are preferably arranged at different distances from the center of rotation so as to attack the hay at varying points and may be arranged in such numbers as suit the particular conditions.

In operation, as the hay, in the form of baled hay for instance, is made to slide down the chute and its forward end enters the opening 11, which is large enough to accommodate a standard sized bale, the members 29 rip or tear into the bale and carry a certain portion of hay along with them. This hay is subjected to further ripping action when passing the stationary members 30 and is then whirled through the drum and is broken into fine particles which are driven through the screen by centrifugal force. Since the entire drum is perforated, the discharge area is substantially equal to the area of the drum.

The particles are drawn toward the outlet 10 by the air currents created through centrifugal force as well as by suction produced by the cyclone collector connected to the outlet.

In addition to this the discharge is aided materially by gravity and the structural features of the discharge chambers 14 and 15 expanding in a downward direction and toward the discharge. This prevents any particles from settling or lodging upon the outer face of the screen in the pockets formed in the upper parts of the discharge chambers and tends to keep the entire surface of the screen clean and available for discharge.

It will also be noted that the manufacture of the machine is comparatively simple, there being only a few parts involved and all these parts being easily accessible for repair and occasional cleaning, if necessary.

I claim:

1. In a pulverizer, a drum having perforations in the periphery thereof and having an axial intake opening of substantial size, means for feeding bunched material through the opening, a rotor, means for revolvably mounting the same within the drum, the rotor comprising a plurality of flat radial arms having inner ends running parallel to the end walls of the drum, central plates on opposite sides of said inner ends and being substantially co-extensive in size with the intake opening and being spaced from both ends of the drum, and means for clamping the plates upon the arms having prongs projecting therefrom toward the intake opening for tearing and ripping the bunched material fed toward the rotor and for throwing the said material outward, the arms being twisted immediately outside the plates and substantially opposite the margin of the opening to produce an impeller effect for distributing the separated material substantially through the depth of the drum, and the arms terminating in substantially transverse blades extending to within close proximity of the drum for whirling the material against the walls of the drum perforations whereby the material is comminuted into fine particles, the margin of the intake opening having prongs projecting inwardly therefrom in overlapping relation to the rotor prongs and substantially opposite the twisted portions of the rotor arms to cooperate with the rotor prongs in directing the material carried by the latter toward the twisted portion of the arms.

2. In a pulverizer, a drum having perforations in the periphery thereof and having an axial intake opening of substantial size, means for feeding bunched material through the opening, a rotor, means for revolvably mounting the same within the drum, the rotor comprising a plurality of flat radial arms having inner ends running parallel to the end walls of the drum, central plates on opposite sides of said inner ends and being substantially co-extensive in size with the intake opening, and being spaced from both ends of the drum, and means for clamping the plates upon the arms having prongs projecting therefrom toward the intake opening for tearing and ripping the bunched material fed toward the rotor and for throwing the said material outward, the arms being twisted immediately outside the plates and substantially opposite the margin of the opening to produce an impeller effect for distributing the separated material substantially through the depth of the drum, and the arms terminating in substantially transverse blades extending to within close proximity of the drum for whirling the material against the walls of the drum perforations whereby the material is comminuted into fine particles, the margin of the intake opening having prongs projecting inwardly therefrom in overlapping relation to the rotor prongs and substantially opposite the twisted portions of the rotor arms to cooperate with the rotor prongs in directing material carried by the latter toward the twisted portions of the arms, and the blades at the ends of the arms having transverse plates extending toward the intake wall of the drum in overlapping relation to the prongs projecting from said wall for whirling material flying radially beyond the latter prongs.

3. In a pulverizer, a drum having perforations in the periphery thereof and having an axial intake opening of substantial size, means for feeding bunched material through the opening, a rotor, means for revolvably mounting the same within the drum, the rotor comprising a central body portion having prongs projecting therefrom toward the intake opening for tearing and ripping the bunched material fed toward the rotor and for throwing the said material outward, and arms projecting from the body portion, the arms being twisted immediately outside the body portion and substantially opposite the margin of the opening

to produce an impeller effect for distributing the separated material substantially through the depth of the drum, and the arms terminating in substantially transverse blades extending to within close proximity of the drum for whirling the material against the walls of the drum perforations, whereby the material is comminuted into fine particles, the margin of the intake opening having prongs projecting inwardly therefrom in overlapping relation to the rotor prongs and substantially opposite the twisted portions of the rotor arms to cooperate with the rotor prongs in directing the material carried by the latter toward the twisted portion of the arms.

4. In a pulverizer, a drum having perforations in the periphery thereof and having an axial intake opening of substantial size, means for feeding bunched material through the opening, a rotor, means for revolvably mounting the same within the drum, the rotor comprising a central body portion having prongs projecting therefrom toward the intake opening for tearing and ripping the bunched material fed toward the rotor and for throwing the said material outward, and arms projecting from the body portion, the arms being twisted immediately outside the body portion and substantially opposite the margin of the opening to produce an impeller effect for distributing the separated material substantially through the depth of the drum, and the arms terminating in substantially transverse blades extending to within close proximity of the drum for whirling the material against the walls of the drum perforations, whereby the material is comminuted into fine particles, the margin of the intake opening having prongs projecting inwardly therefrom in overlapping relation to the rotor prongs and substantially opposite the twisted portions of the rotor arms to cooperate with the rotor prongs in directing the material carried by the latter toward the twisted portion of the arms, and the blades at the ends of the arms having transverse plates, extending toward the intake wall of the drum in overlapping relation to the prongs projecting from said wall for whirling material flying radially beyond the latter prongs.

5. In a pulverizer, a drum having perforations in the periphery thereof and having an axial intake opening of substantial size, means for feeding bunched material through the opening, a rotor, means for revolvably mounting the same within the drum, the rotor comprising a central body portion having means for throwing material fed thereagainst through the intake opening in an outward direction, and arms projecting from the body portion, the arms being twisted immediately outside the body portion and substantially opposite the margin of the opening to produce an impeller effect for distributing the separated material substantially through the depth of the drum, and the arms terminating in substantially transverse blades extending to within close proximity of the drum for whirling the material against the walls of the drum perforations, whereby the material is comminuted into fine particles, the margin of the intake opening having prongs projecting inwardly therefrom into the path of the material thrown outward by the rotor and substantially opposite the twisted portions of the rotor arms for directing said material toward said twisted portions.

6. In a pulverizer, a drum having perforations in the periphery thereof and having an axial intake opening of substantial size, means for feeding bunched material through the opening, a rotor, means for revolvably mounting the same within the drum, the rotor comprising a central body portion having means for throwing material fed thereagainst through the intake opening in an outward direction, and arms projecting from the body portion, the arms being twisted immediately outside the body portion and substantially opposite the margin of the opening to produce an impeller effect for distributing the separated material substantially through the depth of the drum, and the arms terminating in substantially transverse blades extending to within close proximity of the drum for whirling the material against the walls of the drum perforations, whereby the material is comminuted into fine particles, the margin of the intake opening having prongs projecting inwardly therefrom into the path of the material thrown outward by the rotor and substantially opposite the twisted portions of the rotor arms for directing said material toward said twisted portions, and the blades at the ends of the arms having transverse plates extending toward the intake wall of the drum in overlapping relation to the prongs projecting from said wall for whirling material flying radially beyond the latter prongs.

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