March 6, 1951 J. DUTRA, JR 2,544,072

ROTARY CENTRIFUGAL PULVERIZER WITH INTERMESHING KNIVES ON ROTOR AND STATOR

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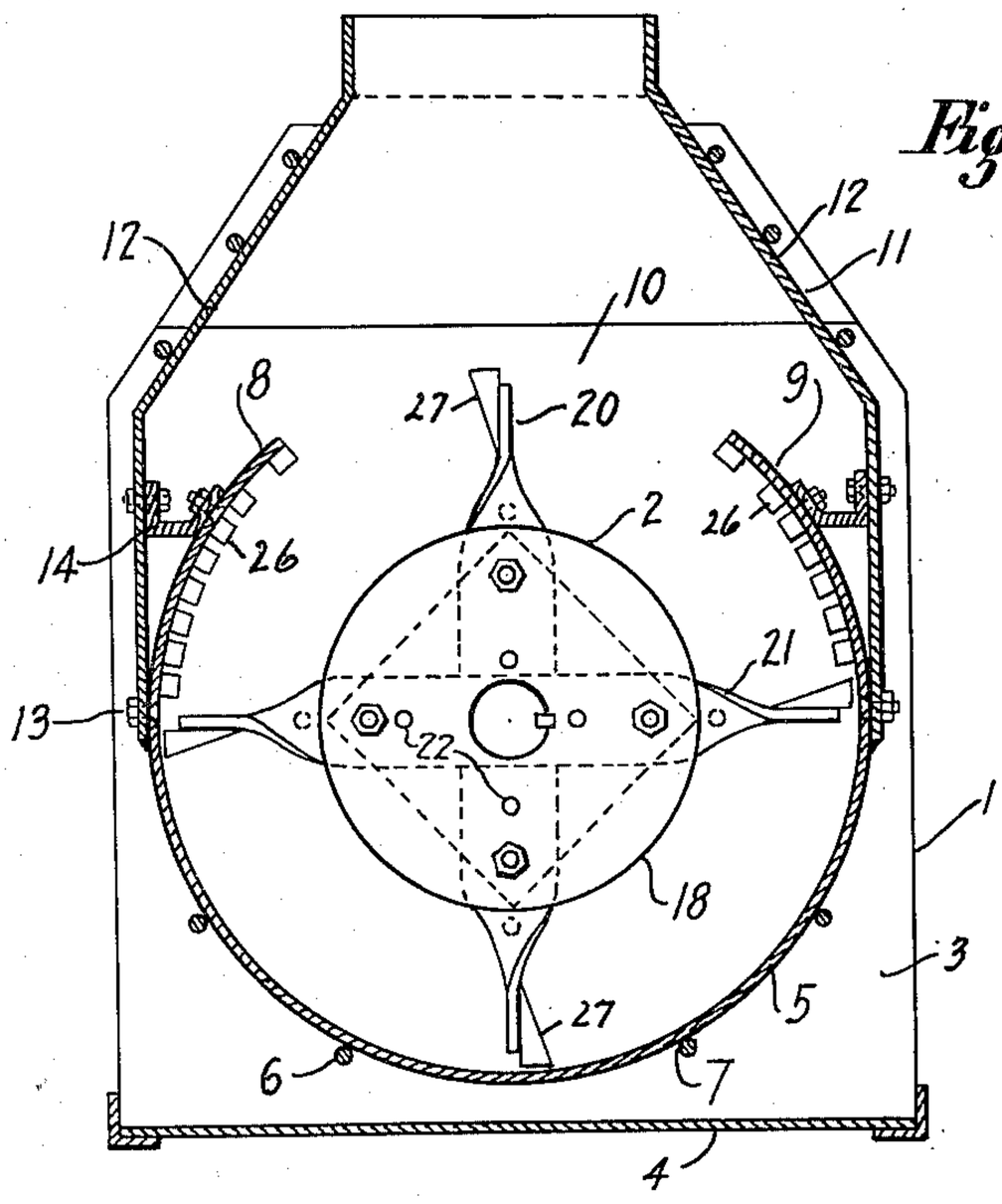

Fig. 1.

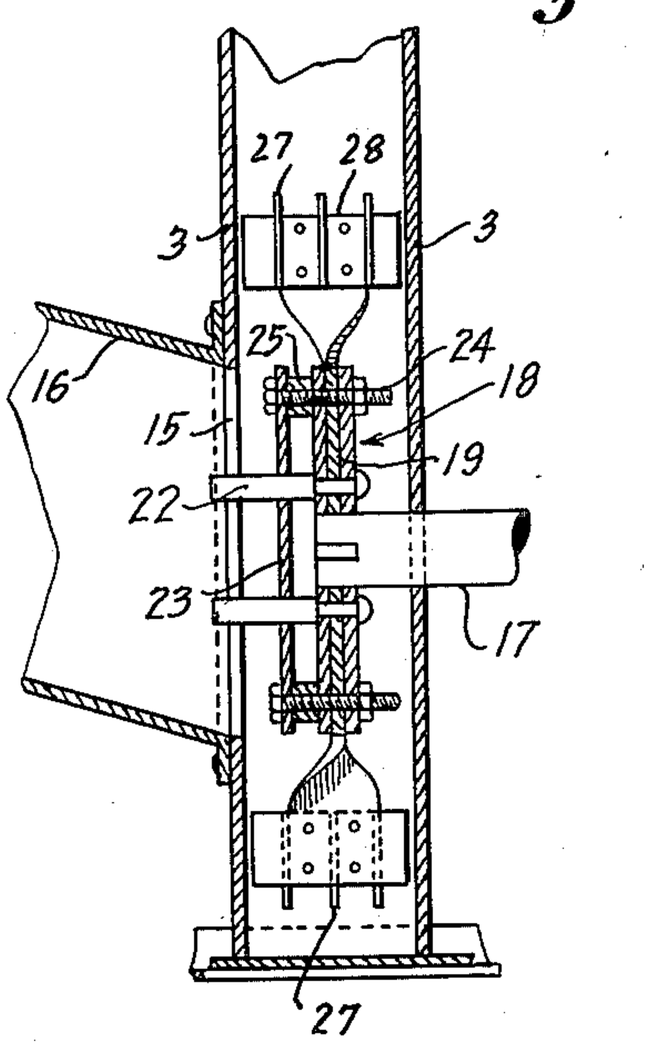

Fig. 2.

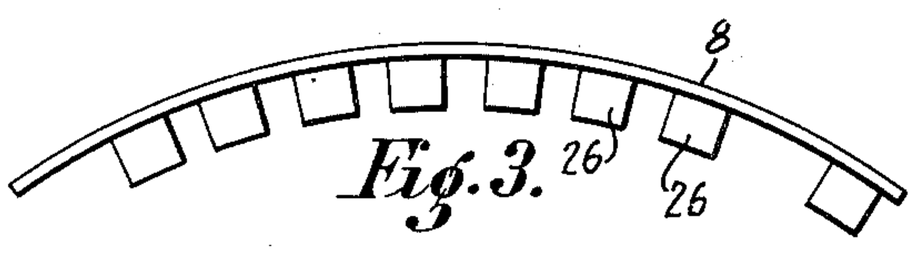

Fig. 3.

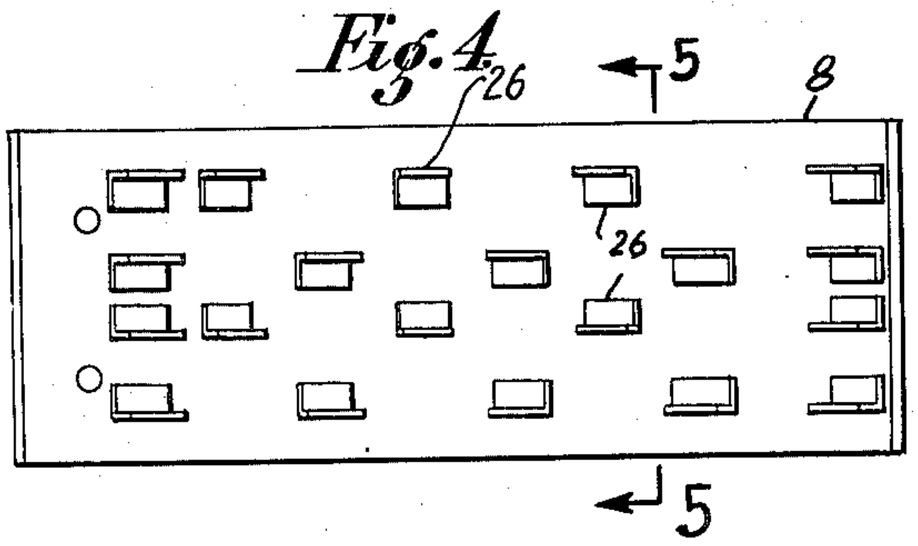

Fig. 4.

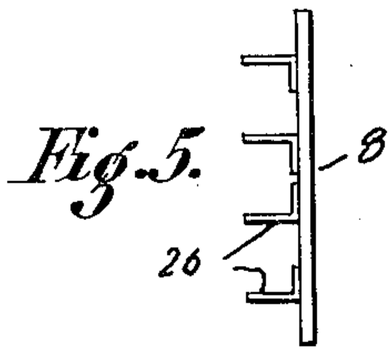

Fig. 5.

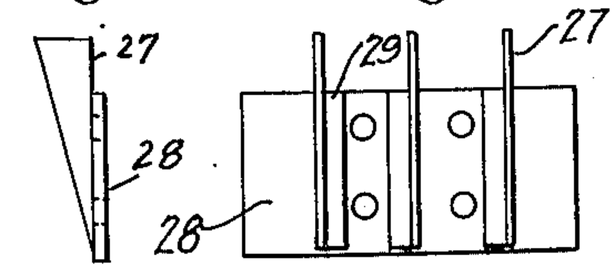

Fig. 6.

Fig. 7.

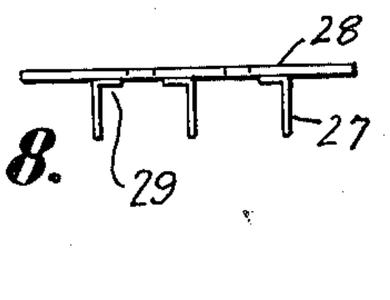

Fig. 8.

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ROTARY CENTRIFUGAL PULVERIZER WITH INTERMESHING KNIVES ON ROTOR AND STATOR

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2 Claims. (Cl. 241—186)

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The present invention relates to improvements in feed mills and has particular reference to mills used for comminuting roughage such as alfalfa hay, grain hay, straw and other animal feed of similar character, although it may also be used for breaking up other feed such as the pits of prunes and all kinds of grain and corn, particularly when the latter are fed into the machine along with the roughage.

More particularly my invention is an improvement on the Pulverizer described in the Patent No. 2,248,640 to Irven T. Miller, dated July 8, 1941.

In the latter patent the material was discharged, by centrifugal force, against a cylindrical screen and was pulverized by impact with the walls of the screen holes.

The centrifugal force was relied on for discharging the comminuted material through the screen holes and through a stack mounted above the screen.

While this method of comminuting material was very successful and is in extensive use at the present time, it is limited to the use of relatively dry roughage which readily breaks up under the impact as described.

In the present invention it is proposed to provide a method whereby relatively damp roughage may be comminuted or shredded resulting in a product which may be described as shredded rather than pulverized roughage.

It is further proposed to provide a structure which allows foreign elements such as nails and small bolts entering the machine to more easily escape therefrom.

Further objects and advantages of my invention will appear as the specification proceeds, and the novel features of my invention will be fully defined in the claims attached hereto.

The preferred form of my invention is illustrated in the accompanying drawing, in which

Figure 1 shows a vertical section through my machine transverse to the axis thereof,

Figure 2, a fragmentary axial section through the machine,

Figure 3, an end view of a housing section,

Figure 4, an inside view of said housing section,

Figure 5, a section taken along line 5—5 of Figure 4,

Figure 6, an end view of a rotary blade section,

Figure 7, a front view of the same, and

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Figure 8, an outside view of the blade section.

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

Referring to the drawing in detail, my feed mill comprises in its principal features a housing 1 and an impeller 2 revolvable therein.

The housing is relatively narrow and comprises two spaced and parallel end walls 3 resting on a base plate 4 and a cylindrical wall or drum 5 supported between the same, the walls being held in assembled relation by means of suitably placed bolts 6, some of which serve as supporting members for the cylindrical wall.

The latter wall as shown in the preferred form of the invention, consists of three sections 7, 8 and 9. The section 7 is semi-cylindrical in form and makes up the lower portion of the drum. It may have a plain inner face but, depending upon objects to be accomplished, may be constructed in the same manner as the two other sections now to be described.

The sections 8 and 9 are curved to the same diameter as the lower section and are made to rest on the end edges of the latter so as to form continuation thereof. The circumferential length of these sections is approximately equal to one-eighth of the total circumference of the drum, so that the upper edges of these sections leave a wide gap or discharge opening 10 between the same, the opening extending through substantially one-quarter of the circumference of the drum.

A stack 11 is supported between the end walls 3, the stack including two side walls 12 secured upon the lower ends of the sections 8 and 9 by means of bolts 13 and securely held between the end walls by some of the bolts 6, as shown. The upper portions of the sections 8 and 9 are anchored to the walls of the stack by means of suitable brackets 14.

The front wall 3 of the housing is formed with an intake opening 15 located centrally with respect to the drum, and an inclined chute 16 is used for feeding material such as loose or baled roughage to the drum.

A drive shaft 17 extends through the rear wall

3 into the drum and is suitably mounted and driven by means (not shown) outside of the housing. The inner end of the shaft carries an impeller 18 which is here shown as comprising three plates 19 secured upon one another, the central one of the three plates having a number of blades 20 projecting therefrom. The blades are twisted near the circumference of the plates as at 21 to produce a propeller effect which causes material fed from the front end to be evenly distributed through the width of the drum. The blades themselves are arranged transversely of the drum, as shown.

The plate assembly has a number of prongs 22 projecting forwardly into the opening 15 of the front wall 3, these prongs being intended to tear into the material and discharge the material centrifugally when the impeller is rotated at high speed. The prongs are spaced unevenly from the center of rotation so as to follow different paths and to command substantially the entire intake opening of the drum. The amount of material which it is desirable to feed varies with the character of the material and in order to effect a control of the amount I provide a face plate 23 secured upon the plates 19 by means of bolts 24. The face plate is held in spaced relation to the plates 19 by means of washers 25 and the position of the face plate may be adjusted by substitution of different washers. The closer the face plate is moved to the plate assembly, the deeper will be the cuts made by the prongs and the more material will be fed.

Thus, in the normal operation of the machine, material is fed down the chute, is torn into by the prongs and is thrown outward by centrifugal force, the blades 20 serving to distribute the material through the entire width of the drum.

The machine thus far described is substantially similar to that disclosed in the afore-mentioned patent, and the principal novel feature of the present invention is the material shredding means involving cooperative knives formed on the ends of the impeller blades and on the inside of the sections 8 and 9.

Each of the sections 8 and 9 has a series of knives 26 projecting inwardly therefrom, the knives being arranged, in the form shown, in four spaced and parallel rows, as seen particularly well in Figure 4. Each knife may be made in the form of an angle iron, one flange being secured upon the section and the other flange projecting inwardly, in circumferential direction. The flanges are comparatively thin, have parallel side walls and relatively dull end edges which are intended to tear rather than to cut.

The knives project from the section through a short distance only, approximately as shown in the drawing, and the transverse blades on the impeller or rotor are disposed to come fairly close to, but to clear, the knives when the impeller is rotated.

Each of the blades 20 has a series of knives 27 projecting outwardly therefrom, and these knives are positioned to project into the spaces between the knives 26 when moved opposite either of the drum sections 8 or 9. The knives 27 are mounted on plates 28 which again are secured upon the blades 20, the knives being secured by means of flanges 29 and being preferably arranged to pass midway between the knives 26 mounted on the drum. The plates 28 are of a width corresponding substantially to the width of the drum so as to catch substantially all of the material thrown outward toward the wall of the drum. The depth of the knives 27 beyond the plates 28 is substantially the same as the depth of the knives 26, so that the major portions of the knives 26 and 27 cooperate with one another in tearing apart the material caught between the same.

A comparatively large opening 10 in the upper portion of the drum allows the comminuted material to escape and to be discharged through the stack 11 by centrifugal force.

While for the purposes of the present invention I have found the arrangement as shown satisfactory, it should be understood that the knives on the inside of the drum may be extended to cover a wider area and possibly the entire drum surface without the exercise of invention.

In operation, the material, such as baled hay or loose hay is fed toward the intake opening of the machine on the chute 16 and is acted on by the four prongs 22 which tear into the material in as many concentric paths. The prongs discharge the material toward the drum wall and the twisted portions of the blades 20 serve to propel at least a portion of the material toward the rear wall of the drum so as to effect a substantially uniform distribution of the material through the width of the drum.

The plates 28, which extend through the width of the drum and which pass in close proximity of the fixed knives 26 cause the material to impact upon the rear edges of the knives for further breaking up the material, and the knives 27 on the impeller cooperate with the stationary knives 26 for shredding and tearing such strands as are too stringy and tough to break in response to mere impact and also prevent the bunching of material between the fixed knives.

I claim:

1. In a feed mill for shredding roughage or the like, a housing having a cylindrical wall with a gap in the circumference to form a discharge opening and having spaced end walls, with the cylindrical wall extending from one end wall to the other and with an intake opening located centrally in one of the end walls, means for feeding roughage toward the intake opening, an impeller mounted axially in the housing and having means for gripping roughage and for discharging the same centrifugally, spaced knives projecting from the inside of the wall, and radially disposed, transverse blades mounted on the impeller to pass just inside of and in close proximity to the knives for thrusting the roughage toward the latter so as to break up the roughage by impact, the blades having knives projecting therefrom in overlapping relation with the former knives and adapted for passing between the latter knives for tearing and removing strands of roughage too tough to break in response to impact.

2. In a feed mill for shredding roughage or the like, a pair of spaced end plates, a semi-cylindrical wall mounted between the plates, a chimney structure mounted between the plates above the semi-cylindrical wall, a pair of cylindrical sections mounted on the edges of the wall to form continuations thereof, and having spaced upper edges to form a gap underneath the chimney, a rotor in the wall and concentric therewith, one of the plates having an intake opening opposite the rotor, axially spaced knives projecting from the inside of the cylindrical sections, and transverse blades mounted on the rotor to pass just inside of and in close proximity to the knives, the blades having knives projecting therefrom in overlap-

ping relation with the former knives for passing between the latter when the rotor is rotated.

JOHN DUTRA, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
100,302	Lyons	Mar. 1, 1870
226,234	Lampert	Apr. 6, 1880
646,252	Andree	Mar. 27, 1900
807,136	Spurgin	Dec. 12, 1905
908,801	Ponser	Jan. 5, 1909
1,025,480	Pack	May 7, 1912
1,451,424	Head	Apr. 10, 1923
1,632,341	Koch	June 14, 1927
1,648,341	Goble	Nov. 8, 1927
1,929,671	Barel	Oct. 10, 1933
2,148,547	Fiese	Feb. 28, 1939
2,248,640	Miller	July 8, 1941
2,286,545	Hoehn	Jan. 16, 1942

FOREIGN PATENTS

Number	Country	Date
49,260	Australia	Aug. 10, 1911
702,058	Germany	Jan. 29, 1941
2,759	Great Britain	1914