June 24, 1930. S. R. GATELY 1,767,921

CUTTING AND GRINDING MILL

Filed May 25, 1927 2 Sheets-Sheet 1

Fig. 1.

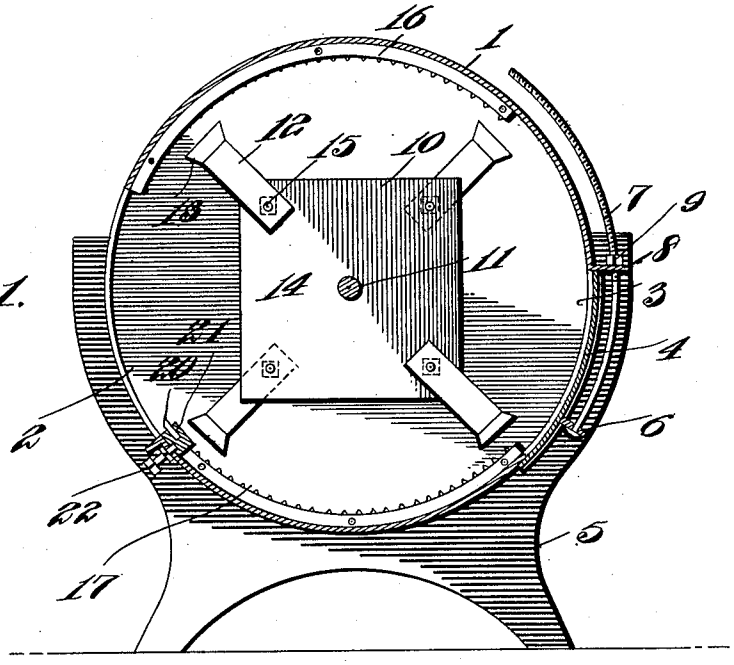

Fig. 2.

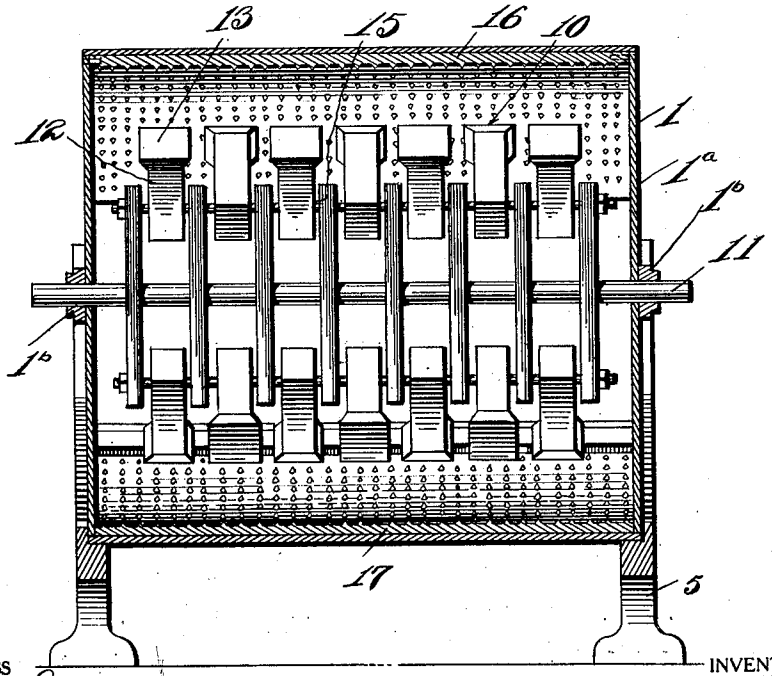

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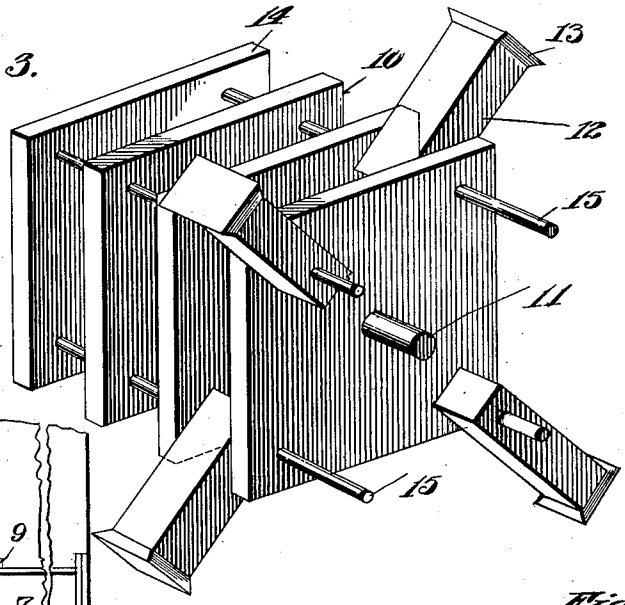
Fig. 3.



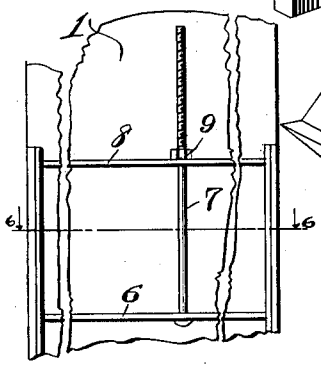
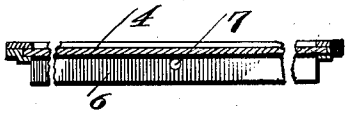


Fig. 5.

Fig. 6.



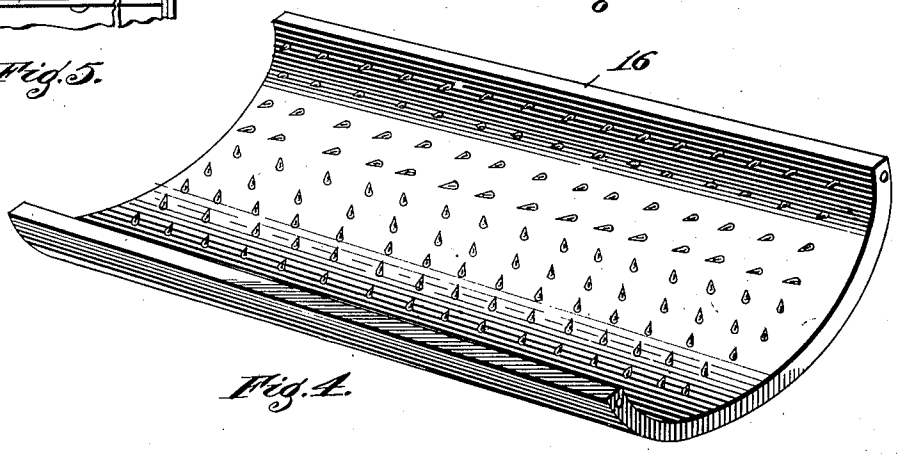


Fig. 4.

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UNITED STATES PATENT OFFICE

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CUTTING AND GRINDING MILL

Application filed May 25, 1927. Serial No. 194,208.

This invention relates to cutting and grinding machines for feed, silage, and the like.

It is well known that the feed crushers and grinders commonly in use are not practical for grinding forage such as corn fodder, cane, sweet clover, and the like, for the reason that such material becomes damp during the crushing or grinding operation, and the shell thereof forms a fine shred of fiber, varying in length from four to six inches. These shreds will not grind or crush and will not pass through the grate, and consequently accumulate and choke the machine.

A primary object of this invention is to overcome these objections, which is accomplished by providing means which will cut this material before the fibers or shreds are formed.

Another object is to so construct a machine of this character, that the material will be cut into small pieces, before passing to the grinding mechanism, thereby avoiding all possibility of the formation of long fibers during the crushing or grinding operation and the choking of the machine incident thereto, and whereby a more uniform grinding of the material is effected with less power.

Another object is to so construct a machine of this character that the material fed thereto will be cut in comparatively small pieces, and then comminuted to any desired size, and in which the cutting blade is protected from abuse except while actually cutting.

Another object is to so construct a machine of this character that the material will be cut off in small bits regardless how heavy the material operated on may be.

Another object is to construct a machine of this character, so that should iron or other hard substances be accidentally fed to the cutting mechanism, the cutting members, when contacting said hard substance, will swing back and thus prevent injury to the cooperating blade and avoid other breakage of the machine.

Another object is to provide a machine of this character having cutting bars constructed to automatically sharpen themselves while running.

In carrying out these objects, the invention is susceptible of a wide range of modification without departing from the spirit or sacrificing any of the advantages of the claimed invention; there being shown in the drawings for illustrative purposes a preferred and practical form, in which,

Figure 1 represents an end elevation partly in section of a machine constructed in accordance with this invention,

Fig. 2 is a longitudinal vertical section thereof,

Fig. 3 is a perspective view of the rotary member of the machine, the pivoted bars being shown in connection with the front plates only and omitted from those in the rear,

Fig. 4 is a perspective view of one of the grinding plates detached,

Fig. 5 is a detail side elevation, and

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5.

In the embodiment illustrated, a cylindrical casing 1 is shown fixedly mounted in a suitable supporting frame 5 and having an inlet opening 2 at one side and a discharge opening 3 at the other. An adjustable door 4 is designed to vary the size of the discharge opening 3 so that said opening may be regulated to suit the fineness of the material to be discharged. This sliding door 4 is mounted in suitable guides formed on the ends of the container 1 and is equipped with a laterally extending lug 6 in which is fixed a curved rod 7 which also extends slidably through a laterally projecting apertured lug 8 carried by the container at one edge of the discharge opening, as is shown clearly in Fig. 1. This rod 7 is threaded and equipped with an adjusting nut 9 so that the door may be held in adjusted position by tightening up the nut against the lug 8.

The cylindrical container 1 has end closures 1^a provided with centrally disposed bearings 1^b to receive the ends of a shaft 11 which constitutes a part of a rotor 10

mounted within the casing 1 and which is provided with a plurality of pivoted hammer-like edge-wise disposed cutting bars 12, which are shown rectangular in cross section and provided at their other ends with cutting heads 13. These cutting heads 13 are angular in cross section and extend laterally beyond the shank of the hammer with the overhanging or projecting portion inclined or bevelled inwardly toward the shank of the hammer to form a circumferential cutting edge. These cutter bars 12 are endwise disposed, being each pivotally mounted at one end to swing from said end and provided at their free ends with a combined hammer head and cutter.

The rotor 10 comprises the shaft 11 extending longitudinally through the drum or container 1 and rotatably mounted in the bearings 1^b at the ends of said container. Fixedly mounted on this shaft 11 are a plurality of pairs of plates 14, four pairs being shown and having arranged between each pair two of the cutter bars 12 positioned at diametrically opposite corners of the plate. As shown, these plates 14 are made rectangular in form and have passing through the corners thereof rods 15 on which the bars 12 are pivotally mounted. The bars on one side of each plate are arranged in staggered relation to those on the opposite side so that they do not make a full cut across the stationary knife 20 which will be presently more fully described.

Arranged at the top and bottom, respectively, of the cylinder 1 are concave tooth plates 16 and 17 which have the teeth thereof set in close proximity to the cutting heads 13 of the bars 12 and which are designed to prevent the material from bunching up in its passage around the cylinder, and thereby prevent choking of the machine, and pulling down of the power.

The cutting knife 20 extends longitudinally of the cylinder 1 at the lower portion of the inlet opening 2 thereof, as is shown clearly in Fig. 1 and is mounted in a bracket 21 mounted adjacent the lower end of the inlet 2 of the machine. A set screw 22 is carried by the bracket 21 and operates through the wall of the casing, as shown in Fig. 1 to provide for the adjustment of the bracket toward and away from the casing so that the knife 20 will be adjusted toward and away from the cutting heads of the bars 12 and thereby vary the space between the stationary cutting knife and the rotatable cutting bars.

The gist of this invention resides in the location of a stationary cutting knife at the entrance to the machine, in connection with the rotary cutting bars so that the material entering the machine is cut into pieces before the crushing or grinding operation begins so that the formation of long fine fibers is prevented and hence no choking of the machine will occur, thereby providing a machine of greater capacity, performing more uniform grinding with less power. Moreover, the use of a stationary knife at the entrance to the machine avoids the abuse of the rotary knife machine and enables it to stay sharp longer. This stationary knife 20 is removable so that it may be readily taken out and replaced when desired.

The pivotal mounting of the cutting bars 12 permits them to swing back in case a hard foreign substance should be accidentally fed to the machine, and thus prevent breakage of the bars and the stationary knife as well.

The provision of the adjustable discharge door 4 dispenses with an assortment of grates and permits changing from fine to coarse grinding without stopping the machine.

It is of course understood that any suitable power for operating the rotor 10 may be provided and as such constitutes no part of the invention, it is not shown.

It is further understood that the rotor must be revolved at a high rate of speed in order that the cutting bars 12 may swing out by centrifugal force into operative position to cooperate with the cutter 20 in cutting off the material on its entry into the machine, and with the teeth of the concaves 16 and 17 to effect the grinding or crushing operation of the material.

The adjustment of the blade or cutter 20 is desirable to provide for wearing off of the cutting heads 13 of the bars 12.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will, of course, be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention or the scope as claimed.

I claim:—

1. In a mill of the class described, a casing having an inlet at one side and an outlet at the other, an adjustable door for varying the size of said outlet according to the size of the material to be discharged therethrough and means within the casing for first cutting the material into small pieces for dispensing through the inlet and then crushing it.

2. In a mill of the class described, a casing having an inlet and an outlet, a fixed knife extending upwardly across said inlet, a rotor mounted in said casing and comprising a rotatable shaft having a plurality of angular plates fixed thereto in longitudinally spaced relation, rods extending through the corners of said plates, and cutter bars pivotally mounted at one end

on said rods, two of said bars being arranged on each plate at diametrically opposite corners, those of one plate being in staggered relation to those of the other to avoid undue pressure being exerted by the material on the fixed knife.

STEVE R. GATELY.