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C. D. AMMON

1,713,507

HAMMER MILL

Filed Aug. 16, 1928

FIG. 1

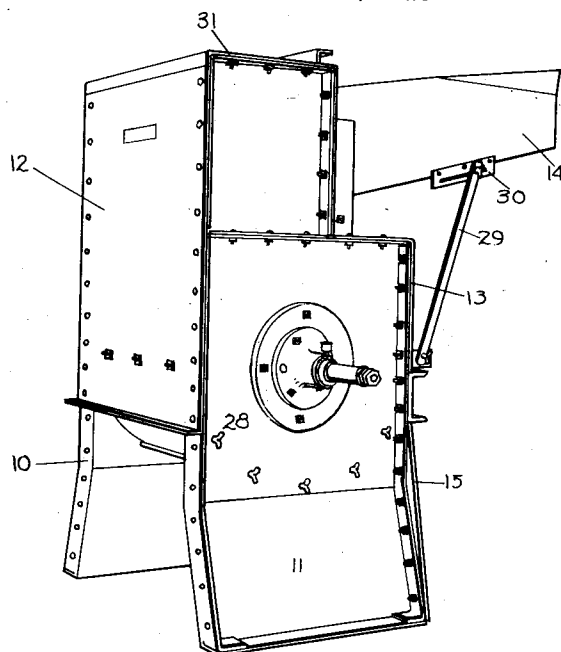


FIG. 4

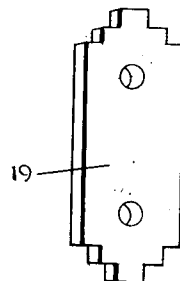


FIG. 2

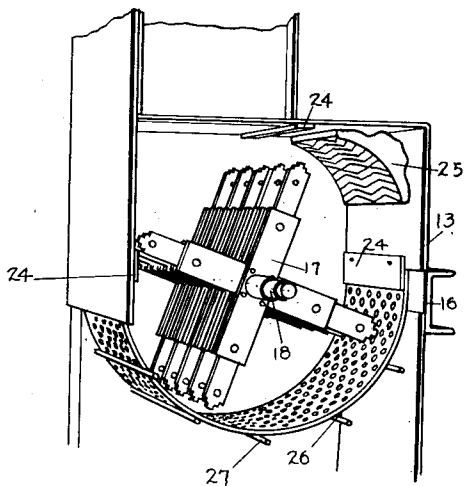
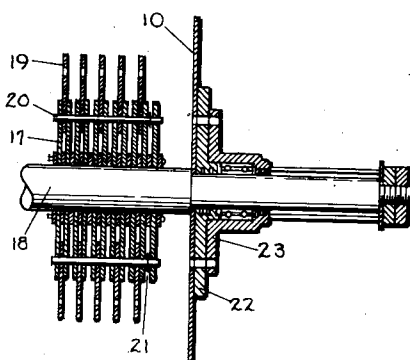


FIG. 3



Chas. D. Ammon. Inventor

by Emil F. Lange

Attorney

UNITED STATES PATENT OFFICE.

CHARLES D. AMMON, OF LINCOLN, NEBRASKA.

HAMMER MILL.

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My invention relates to hammer mills and it contemplates the provision of a hammer mill of very simple form for expeditiously grinding all kinds of feeds.

5 Another object is the provision of symmetrical hammers which are interchangeable and reversible so as to give four grinding surfaces and four pairs of cutting edges which may be utilized whenever one set becomes
10 dull or battered.

Another of my objects is the provision of a connection for the hammers such that the hammers may be quickly and easily replaced with the expenditure of the least amount of
15 time and effort.

Another object is the provision of a screen support of novel form so that the screen may be removed by either of two simple methods.

20 Another object is the provision of a chute which may be adjusted through substantially an entire quadrant to regulate the rate of flow of the feed.

Another object is the provision of a removable wall which may be used at either the front or rear of the feed grinder so as to leave the other side open for removing the ground feed.

30 Having in view these objects and others which will be pointed out in the following description, I will now refer to the drawings, in which

Figure 1 is a view in perspective showing the feed grinder.

35 Figure 2 is a view in perspective showing the inner side of the grinding chamber, one wall being sectioned to disclose the interior parts. The view also shows the connections for supporting the screen.

40 Figure 3 is a sectional view through the cylinder showing particularly the mounting of the hammers and the construction whereby the hammers may be removed.

Figure 4 is an illustration showing one of the hammers.

45 The casing of the hammer mill includes a pair of side walls 10 which are flared outwardly at their base, the flared portions being indicated by the numeral 11. The side walls 10 extend upwardly over both the grinding
50 chamber and the feeding chamber. The casing also includes a rear wall 12 for the feeding chamber and for the grinding chamber but terminating so as to provide an opening for the removal of the ground feed. The front
55 wall 13 extends over only the grinding

chamber, the feeding chamber being covered on its front side by the chute 14. The wall 13 terminates at the same level as that of the wall 12 so as to provide a similar opening for the removal of the ground feed. It is
60 desirable, however, that one of these openings be closed and for this purpose I have provided an interchangeable closure 15 which may be secured at either the front or rear to close that side. The front wall 13 is also
65 provided with a horizontal slit opening for receiving the channel iron 16, the purpose of which will be subsequently explained. The entire casing is heavily reinforced with angle steel at its edges.

70 The cylinder, as best shown in Figures 2 and 3, includes plates and pivoted hammers. The plates 17 are bolted to each other in criss-cross relation and they are mounted on the shaft 18. They are frictionally held on the
75 shaft 18 so that the rotation of the shaft carries the plates with it, the connection, however, being yielding so that when heavy obstacles fall into the mill the plates may remain stationary while the shaft is rotating.
80 The hammers 19 are of the form shown in Figure 4 and they are secured to the plates 17 by means of pins 20 in the manner shown in Figure 3. It will be noticed from an inspection of Figure 4 that the hammers are
85 each provided with two battering surfaces each having a pair of cutting edges and that the hammers are further provided with two apertures so that they are reversible in position on the cylinder. The bearing members
90 for the shaft 18 are arranged for convenience in removing the hammers from the cylinder. The pins 20 are smooth throughout their length having no nuts nor heads which would interfere with their sliding movement. They
95 are held in position in the cylinder by means of cotter pins 21 which prevent their sliding during the operation of the mill. The walls 10 are provided with apertures in circular alignment with the paths of the pins 20 during rotation. The shaft 18 is provided with
100 two bearing members 22 and 23 which are independently secured by means of bolts to the mill and each is provided with an aperture which may be positioned in alignment with the aperture in the plate 10 by rotating the member 23. These apertures are so positioned that they will be out of alignment with each other when both bearing members are in operative position. In this manner the
110

passageway is closed during the operation of the mill so that even though the cotter pin 21 might be accidentally released it would be impossible for the pin 20 to slip into the aperture. When it is desired to remove the hammers 19 it is only necessary to release the bearing member 23 and to turn it axially until the two apertures are in alignment with each other and to then turn the cylinder on its axis to bring the pin 20 into alignment with the aligned apertures. The cotter pin 21 is then removed so that the pin 20 may be withdrawn through the aligned apertures in the side wall 10 and in the bearing members 22 and 23.

The hammers are pivotally connected to the plate 17 but during their rotation they are held under centrifugal force in a radial direction. In order to provide a free pivotal relation between the hammers and the plates, the hammers are slightly less in thickness than the width of the space between the plates. The rapid rotation of the cylinder causes the hammers to strike the grain in mid air as it is fed into the grinding chamber. The impact of the hammers against the grain causes a crushing of the grain but it is desirable that further impacts be provided for in order to increase the grinding action of the mill. For this purpose I provide a plurality, preferably three in number, of anvils 24 which are made from hard steel and which are secured to extend across the interior surfaces of the front, rear and top walls. The result is that the partly crushed grain is thrown from the hammers on to the anvils where it is further crushed. In addition, I provide a grinding plate 25 having a corrugated grinding surface for grinding the grain by abrasion as it is hurled tangentially by the hammers.

After grinding, the grain is carried across the screen 26 and a portion of the grain will fall through the screen, partly by gravity and partly by the air currents set up by the rapidly rotating cylinder. Mills of this character are usually provided with a series of screens having openings of various sizes so that the grain may be ground fine or coarse as desired. Provision is therefore made for the easy removal of the screen from the mill. In the present instance the screen is supported on a plurality of bars or rods 27. These rods 27 pass through both side walls 10 and they are secured at their free ends by thumb nuts 28. It is therefore possible by releasing the thumb nuts 28 and withdrawing the rods 27 to remove the screen through the bottom of the mill. The release of these connections allows the screen to drop to the bottom. In my construction, however, I provide a second means for the removal of the screen. One of the anvils 24 is bolted to the front wall 13 and the channel iron is readily removable so as to leave an opening in the front wall 13 at the

end of the screen which makes it possible to withdraw the entire screen through the opening in the front wall 13, the screen being merely supported on the rods 27.

Attention is directed particularly to Figure 4 showing the construction of the hammer. The hammer is entirely symmetrical and it is provided with two apertures either of which is adapted to receive the pin 20. When thus mounted on the pin 20 a little over three fourths of the hammer is exposed and since the wheel travels in one direction only, only about three fourths of one of the battering surfaces of the hammer is utilized at one time, the greatest wear coming at the outer end portion. The edges of the battering surfaces are sharp so that grains which are struck at the edges of the hammers are not only battered but cut. The ends of the hammer are stepped so as to increase the cutting surfaces. The great advantage of this construction of hammer is that it may be reversed in end to end relation or in side to side relation whereby four battering surfaces and four pairs of cutting edges are available. In other words, when one pair of cutting edges becomes dulled or one pair of the battering surfaces becomes too badly battered for effective work, the operator need only remove the pin 20 and to place one of the three other battering surfaces in operative position.

The chute 14 is pivotally connected to the mill and it is supported by means of a brace 29 which is detachably secured at its lower end to a bracket on the mill. The upper extremity of the brace 29 is slidable in a slotted plate 30 so that the inclination of the chute may be varied within the limits of the slot in the plate 30. In order to increase the range of adjustment of the chute 30, I provide a support to which the lower end portion of the brace 29 may be detachably secured and which is vertically adjustable to various heights. In this manner there is provided a range of adjustment from very slightly above the horizontal to almost vertical. In mills of this type an extreme range of adjustment of the chute is desirable for the reason that the angle of repose of the various grains ranges between wide limits. When grinding cornstalks it is desirable and practically necessary that the stalks be fed into the mill in a vertical line as they do not readily turn corners. I have therefore provided a removable top wall 31 for the top opening which is to be utilized for material which requires that the chute 14 be placed in its vertical position. For ordinary grains the top plate 31 must necessarily be in position since otherwise the ground feed would be thrown out through the open top with considerable velocity. With cornstalks and similar material, the material itself will furnish a closure for the top opening to prevent the losing of the ground feed.

Having thus described my invention in such full, clear, and exact terms that its construction and operation will be readily understood by others skilled in the art to which it pertains, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A hammer mill including a casing, a hammer cylinder having a shaft journaled in the walls of said casing, a pair of anvils secured to the inner surfaces of the walls of said casing and positioned in parallelism with the shaft of said cylinder, and a screen beneath said cylinder, said screen having its forward and rear end portions loosely positioned between said casing and said anvils.

2. A hammer mill including a casing, a hammer cylinder having a shaft journaled in the walls of said casing, a plurality of anvils secured to said casing at the inner walls thereof and positioned in parallelism with the shaft of said cylinder, a screen positioned beneath said cylinder, and a plurality of screen

supporting members releasably secured to the walls of said casing.

3. A hammer mill including a casing and a hammer cylinder having a shaft journaled in the walls thereof, said cylinder having a plurality of plates loosely mounted in spaced apart and criss cross relation on said shaft, pivot pins passing through said plates adjacent the outer extremities thereof, hammers on said pivot pins between said plates, said casing being provided with an aperture in circumferential alignment with said pivot pins whereby said pivot pins may be withdrawn for releasing said hammers without disassembling said hammer mill, and a bearing member for said shaft, said bearing member being secured to said casing to normally close the aperture of said casing when said bearing member is in its operative position and having an aperture which may be aligned with the aperture in said casing.

In testimony whereof I affix my signature.

CHARLES D. AMMON.