Feb. 26, 1952 J. H. OLIVER 2,587,372

HAMMER MILL FOR GRINDING FEED

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Fig. 1.

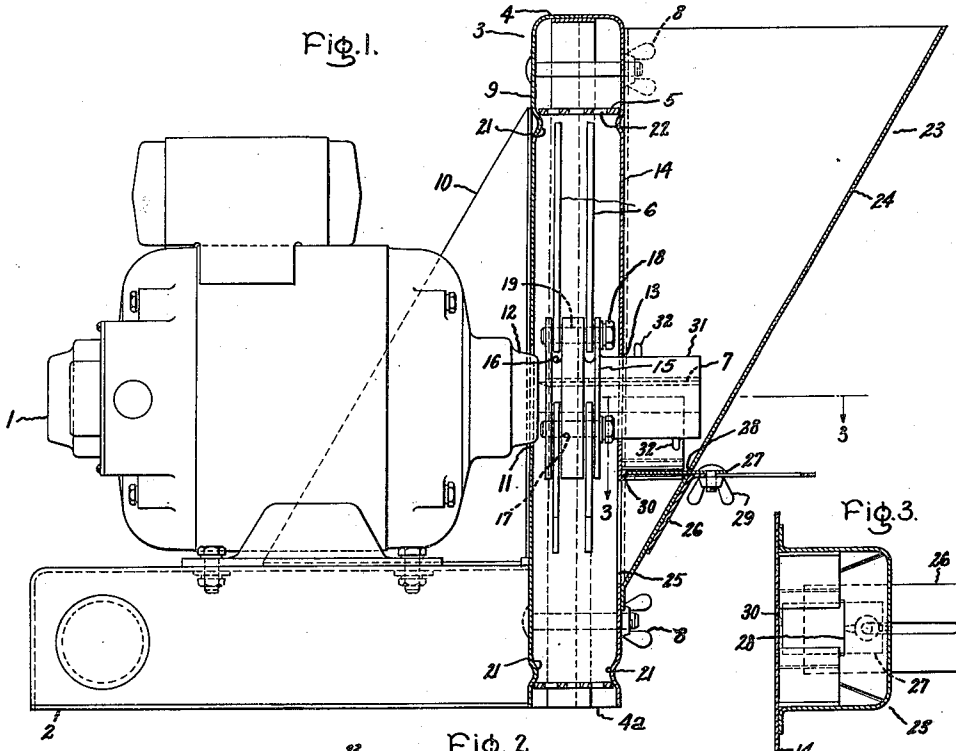
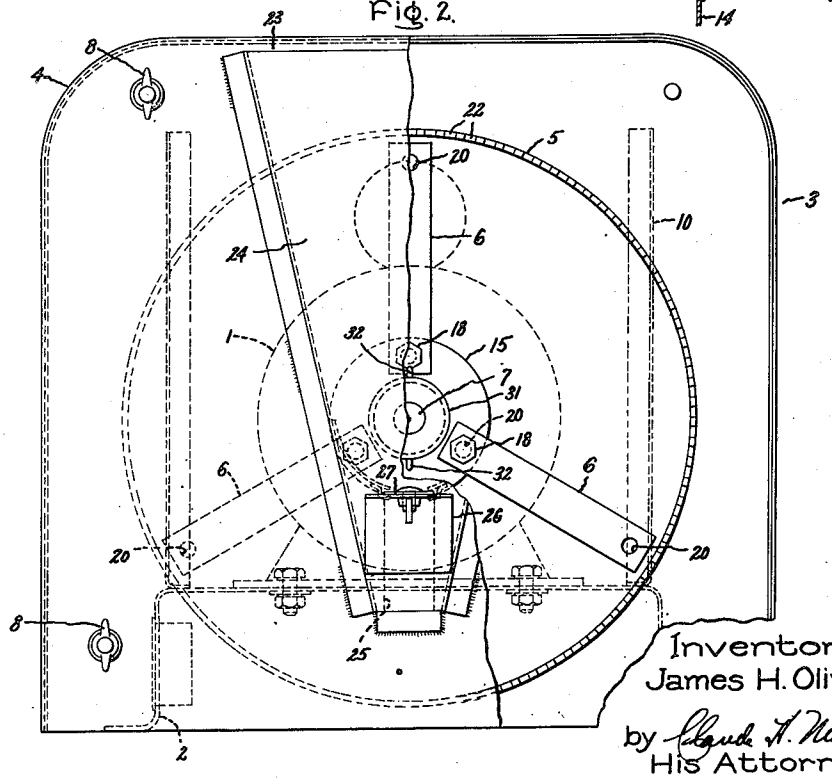


Fig. 3.

Fig. 2.



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HAMMER MILL FOR GRINDING FEED

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2 Claims. (Cl. 241—186)

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This invention relates to feed grinders and, in particular, to an improved feed grinder of the hammer mill type.

In the grinding of corn or grain that is to be fed to cattle, it is desirable to crack the outer protective coating of each kernel of the corn or oats, etc. The object of this is to further the possibility of getting the most nutritive value out of feed. If corn, for example, is fed to animals without the outer protective shell first being cracked, it is possible for the animal to bolt his food to the extent that it is not digested and assimilated, as evidenced by the fact that the kernel will pass intact through the animal. If the outer protective coating of the corn or oats is broken, however, then the natural digestive system of the animal tends to assimilate the full nutritive value of the grain.

In cracking grain for feeding, however, it is possible to go to the other extreme and produce a great quantity of finely pulverized flour which is easily lost as dust. In addition, this finely ground flour apparently is not as desirable to the animals being fed as coarse grain which has merely been cracked.

It is an object of this invention to provide a new and improved feed grinder.

It is a further object of this invention to provide a new and improved feed grinder of the hammer mill type in which grain is automatically fed at a constant but adjustable rate to hammers for cracking.

It is a still further object of this invention to provide a new and improved grinder of the hammer mill type which produces a volume of ground feed output per horsepower input as much as 50% greater than many grinders now on the market.

It is a still further object of this invention to provide a new and improved feed grinder of the hammer mill type which cracks the hull of the grain but produces a minimum percentage of flour.

Broadly, this invention comprises an adjustable automatic feed system, including a rotating agitator that assures a continuous uniform flow of unground grain to a grinder. The feed is fed into the lowermost portion of a housing for rotating hammers in a manner that results in the radially outermost portion of the hammers striking the unground grain. The outer shell of a kernel is thus cracked and the ground portions of the grain are driven through a mesh screen.

Further objects and advantages of this invention will become apparent and the invention will

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be more clearly understood from the following description referring to the accompanying drawing, and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In the drawing, Fig. 1 is a side view, partly in section, of the improved feed grinder; Fig. 2 is an end view, partly in section, of the grinder; while Fig. 3 is a top view of a section taken on the line 3—3 of Fig. 1 looking in the direction of the arrows.

Referring to the drawing, a motor 1 is shown mounted on a base 2 which supports both the motor and grinder 3. Grinder 3 comprises a housing 4, a screen 5, and a plurality of hammers 6 mounted on shaft 7 of motor 1.

Housing 4 may be of any conventional shape, for example, generally rectangular, as shown in the drawing. In a preferred embodiment, housing 4 is constructed to provide for disassembly to allow internal cleaning. This is accomplished by dividing the housing into two halves and providing wing bolts 8 to secure the halves together. The rear portion 9 of the housing is supported by braces 10, which secure it to base 2. Braces 10 may be of any conventional form and may be either welded or bolted to rear portion 9 of housing 4. An opening 11 is provided centrally in rear portion 9 of the housing to accommodate bearing cap 12 of the motor. Shaft 7 of motor 1 extends axially from bearing cap 12 through opening 11 in rear portion 9 and through an opening 13 in the forward portion 14 of housing 4. When wing bolts 8 are unfastened, forward portion 14 of housing 4 is axially slidable over shaft 7.

Centrally within housing 4, a collar 15 is removably secured to shaft 7. Collar 15, in turn, is provided with a pair of circumferential grooves 16 which are axially spaced along collar 15. In this preferred embodiment, three bolt holes 17 are located substantially 120 degrees apart about collar 15. The bolt holes are arranged so that bolts 18 can pass through holes 17 to provide three shafts or pivot pins 19 in each of the circumferential grooves 16. Shafts 19 are adapted to secure the six hammers 6. Each of the hammers 6 is a rod or bar strip of metal flat edged on both sides to provide a flat striking surface to smash grain, rather than to cut it. Each of the hammers 6 is further provided at each end with a hole 20 to provide for mounting on shafts 19. With a hole 20 at each end, the hammers are reversible; consequently, when one end is

worn sharp, the hammer can be reversed, rather than replaced. When the six hammers are mounted on collar 15, the structure is such that each hammer is freely pivotable about its respective pivot pin 19. When shaft 7 of the motor is rotating, however, each of the hammers 6 extends radially outward from its mounting structure and the centrifugal force of rotation causes the hammers to act as if they were rigidly secured to collar 15.

A circumferential screen 5 is positioned between the front and rear portions of housing 4 by indentations 21. The screen is mounted so that its periphery is concentric with shaft 7 of motor 1. The radius of the screen is determined by the length of hammers 6 and is so chosen that when the hammers are fully extended there is only a slight clearance between their outer ends and screen 5. Screen 5 is provided with a plurality of openings 22 having a mesh that depends on the coarseness of the grain desired. In the usual situation, interchangeable screens having different meshes are provided, whereupon, by interchanging the screens, the same grinder may be used for any grain coarseness selected.

A hopper 23, having any conventional shape, is secured to removable front member 14 of housing 4. The general shape of the hopper is unimportant, so long as it is provided with one sloping side 24 for feeding the grain towards the housing 4. An opening 25 is provided in front portion 14 of housing 4 adjacent the point where sloping side 24 of hopper 23 meets outer portion 14. It is important that opening 25 be so positioned that grain entering from the hopper is fed to the housing at a point such that the grain is struck by the outer tip of hammers 6.

Sloping side 24 is further provided with a bracket 26 for the mounting of a slide plate 27. Slide plate 27 fits into an opening 28 in sloping side 24 and may be secured in any position to which it is adjusted by wing nut 29 to regulate a gap 30 adjacent front portion 14 of housing 4. Gap 30, in turn, controls the amount of grain fed to housing 4 through opening 25.

As has been previously mentioned, shaft 7 of motor 1 extends through both the rear and forward portions of housing 4. In addition, it is provided with an extension 31 that is substantially as long as the distance between forward portion 14 of housing 4 and a point on sloping side 24 adjacent the shaft. Extension 31 is provided with a pair of radial openings which removably accommodate pins 32. During the rotation of shaft 7, pins 32 agitate grain stored in the hopper to assure a continuous supply of the unground grain through gap 30 to opening 25 in housing 4.

In the operation of this improved grinder, coarse or unground grain is stored in hopper 23. When motor 1 is started, pins 32 agitate the grain, assuring a continuous flow through an adjustable gap 30, and through opening 25 into housing 4. As the coarse grain enters housing 4, it is struck by rotating hammers 6 at their lowermost point. With this structure, a great deal of the grain is driven through screen 5 after being hit just once by a hammer; consequently, the pulverization effect which produces flour is avoided. As the grain passes through the screen, it falls toward the bottom of housing 4 through an opening 4a positioned

in the bottom of the housing until it reaches a storage bin (not shown).

One of the more important features of this invention is the introduction of the grain near the bottom of the mill. If the grain is introduced into the mill near the center, or above center, there is a greater tendency for the hammers to drive the grain upward, which results in its being struck many times by the rotating hammers, thereby producing a great amount of undesirable flour.

Another feature of this invention which is considered important is the induction of the feed to the mill in a smooth continuous flow, rather than in small slugs, as is used in other mills. The pins 32, which produce the continuous flow, also provide a means for tearing up any chaff, straw and particles of corn husks which may be in the grain being fed to the mill. Another important feature is that the feeder mechanism, together with the hammers, is mounted directly on the motor shaft, thus eliminating belts and gears with their friction losses which combine to reduce the output of the mill. Tests have proven that with this improved grinder approximately 50 per cent more ground feed per hour per horsepower is obtained as compared with many of the other makes of feed grinders now on the market.

Modifications of this invention will occur to those skilled in the art and it is desired to be understood, therefore, that this invention is not to be limited to the particular embodiment disclosed, but that the appended claims are meant to cover all the modifications which are within the spirit and scope of this invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a feed grinding hammer mill comprising a housing having a vertically disposed removable front member and a ground feed exit opening in the lowermost portion thereof, a horizontally positioned rotor disposed centrally in said housing and passing completely therethrough, means for rotating said rotor, a plurality of hammers secured to said rotor for rotation therewith, a circumferentially disposed screen concentric with said shaft and surrounding said hammers, a hopper secured to said removable front, said rotor being provided with an extension projecting into said hopper, said rotor extension being provided with a pair of pins for agitating unground feed in said hopper, a slide plate in said hopper disposed below said rotor extension, means for moving said slide plate axially of said rotor to define an adjustable feed supply gap, said removable front member defining an opening below a substantially horizontal plane coinciding with the axis of said rotor for admitting unground feed from said hopper to the lower portion of said housing, said opening being arranged to admit unground feed for contact with the radially outermost portion of said hammers.

2. In a feed grinding hammer mill comprising a housing having a vertically disposed removable front member and a ground feed exit opening in the lowermost portion of said housing, a horizontally positioned rotor disposed centrally in said housing and passing completely therethrough, means for rotating said rotor, a collar on said rotor provided with a pair of axially spaced circumferential grooves, a plurality of hammers each comprising a bar of rectangular cross section, a plurality of pivot pins passing

through said collar transverse to said grooves acting in conjunction therewith to provide for pivotable mounting of said hammers on said collar to provide for radial extension of said hammers from said pivot pins toward the periphery of said housing in response to rotation of said rotor, a circumferential screen concentric with said shaft and enclosing the path traversed by said hammers, a hopper having downwardly and inwardly sloping sides to give a downwardly directed flow of unground feed mounted on said removable housing member extending from a point substantially above a horizontal plane coinciding with the axis of said rotor to a point below said center plane, a distance equal to at least the major portion of the said radial extension of said hammers, said rotor extending into said hopper, a slide member mounted in said hopper below the extended portion of the rotor for movement in a direction transverse to the downward flow of feed to provide an adjustable feed supply, said removable member of said housing defining an opening below the opening through which said rotor extends into said hopper and extending downwardly to a point spaced

from said axis an amount at least equal to the major portion of the said radial extension of the hammers for admitting said unground feed from said hopper to the lower portion of said housing for contact with the radially outermost portion of said hammers, and a pair of pins removably secured to said rotor extension in said hopper for agitating said unground feed to assure a continuous supply through said adjustable gap to said housing.

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