

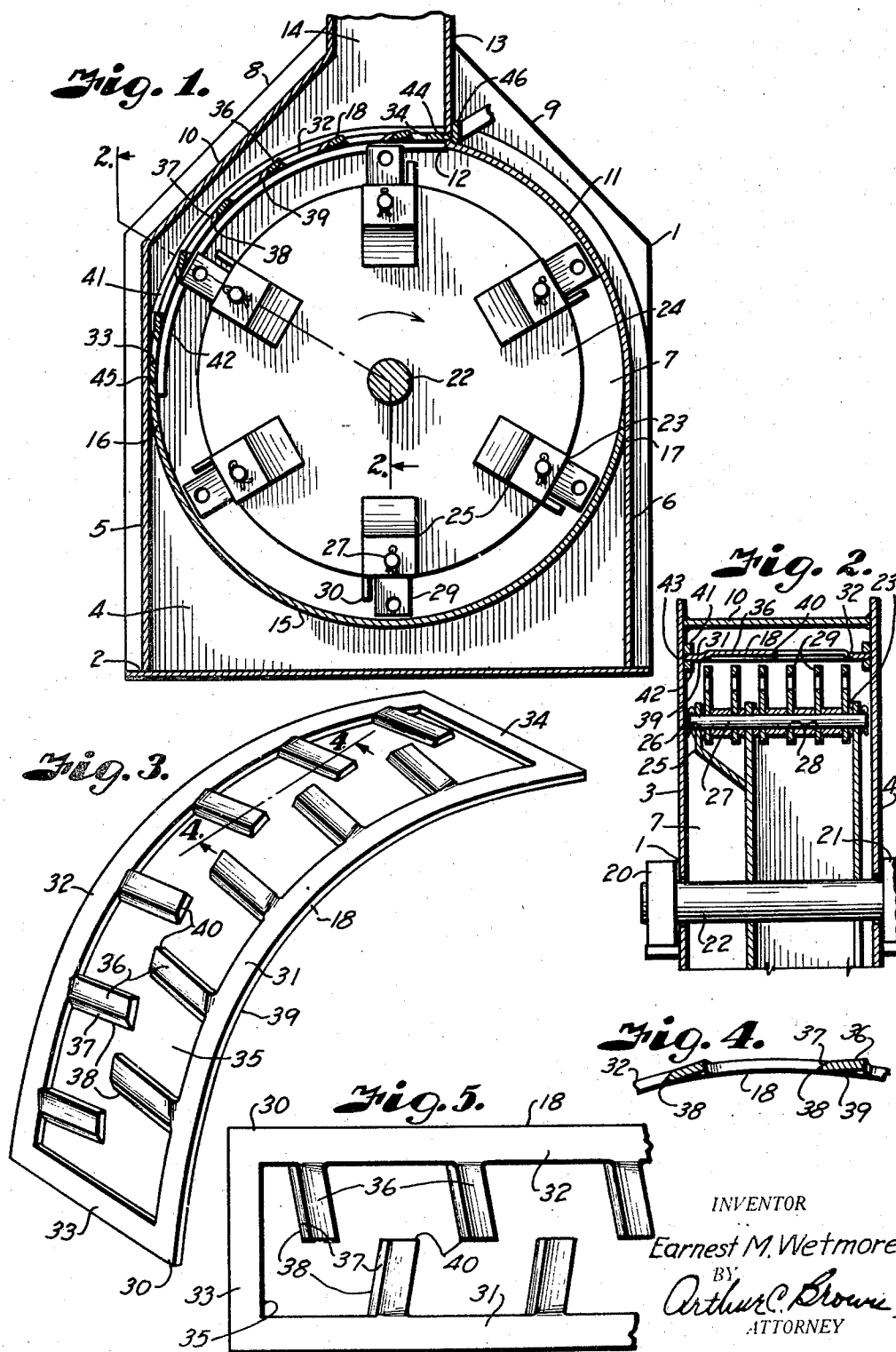
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SCREEN FOR HAMMER TYPE FEED GRINDERS

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SCREEN FOR HAMMER TYPE FEED GRINDERS

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7 Claims. (Cl. 241—88)

This invention relates to screens and more particularly to bar type screens for feed grinders, ensilage cutters, and hammer mills, the principal object of the present invention being to provide a convenient, economical and highly efficient screen.

Screens are provided in hammer mills to retain the feed being ground in the mill while it is being reduced, however, the ensilage delivered to the mill quite often contains twine, fibrous material or the like which balls up and clogs a mill equipped with a conventional bar or perforated type of screen.

Other objects of the invention are, therefore, to provide a screen for hammer mills or the like capable of retarding or retaining the feed in the mill while it is being reduced and not ball up with twine or fibrous material in the feed; to provide a hammer mill screen with bars having sharpened forward edges for cutting material likely to clog the mill; to provide a hammer mill screen with staggered bar segments; to provide a hammer mill screen with bars each having a free end for shedding material therefrom; to provide a screen in a hammer mill in which the motion of the rotor cooperates with the screen to remove material which tends to clog the mill; to provide a hammer mill screen with bars sloping toward the direction of travel of the material in the mill to expedite cutting and gradual shedding of material from the bars of the screen; to provide a hammer mill screen with staggered blades arranged transversely of the direction of travel of material past the blades; and to provide improved elements and arrangements thereof in a screen of the character and for the purpose noted.

In accomplishing these and other objects of the present invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a vertical longitudinal section through a hammer mill provided with a screen embodying the features of the present invention.

Fig. 2 is a transverse sectional view through the mill showing the relation of the screens thereto, substantially on the line 2—2, Fig. 1.

Fig. 3 is a perspective view of the bar type screen embodying the features of the present invention.

Fig. 4 is an enlarged sectional view through the screen on the line 4—4, Fig. 3.

Fig. 5 is a partial plan view of the screen embodying the features of the present invention.

Referring more in detail to the drawing:

1, Fig. 1, designates an ensilage cutter or ham-

mer mill which preferably consists of a base 2 that supports spaced side walls 3 and 4, connected with spaced end walls 5 and 6 to form a housing enclosing a space 7. The upper ends of the side walls taper upwardly and inwardly as at 8 and 9. The upper end of the end wall 5 is directed angularly inwardly as shown at 10. The upper end of the end wall 6 is curved inwardly as shown at 11, terminating as at 12. A vertically arranged wall 13, spaced from the end of the wall 6, is connected to and cooperates with the side walls and end 10 of wall 5 to form a discharge outlet 14 for the mill, leading to a conduit (not shown) that may terminate in a suitable hopper or the like.

Mounted on the side and end walls within the space 7 of the mill is a substantially circularly curved plate 15 connected to the walls 5 and 6, as at 16 and 17, forming the lower portion of a housing, the upper portion of the housing consisting of a concave screen 18 embodying the principal features of the present invention and mounted in the housing to form a continuation thereof as later described.

20 and 21, Fig. 2, designate bearings for relatively supporting a drive shaft 22 that extends through suitable aligned openings in the side walls 3 and 4 of the mill.

23 designates a rotor which preferably consists of a circular plate 24 mounted concentrically on the shaft 22. Secured to the plate 24 and radially arranged in spaced relation about the shaft 22 are bosses 25 of suitable number, depending on the size of the rotor and the duties to be performed thereby. The bosses 25 are provided with apertures 26, whereby bolts or the like 27 may be extended through said apertures and apertures 28 in hammer blades 29 to pivotally mount said hammer blades on the rotor. The hammer blades 29 are allowed to pivot freely in one direction and to points limited by the projecting members 30 on the bosses in the other direction.

The screen 18 preferably includes a rectangular frame 30 consisting of side members 31 and 32 connected by end members 33 and 34, said rectangular frame being rolled to an arcuate or concave shape, the curvature of which is substantially the same as that of the wall 15 of the mill housing. Extending laterally into the space 35 between the side members 31 and 32 and sloping therefrom toward the direction of rotation of the rotor are bar segments 36 which preferably extend substantially to the median arc of the screen or a point midway between the side members 31 and 32. The bars connected

to and extending laterally from the side member 31 are staggered relative to the bars connected to and extending laterally of the side member 32. The bar members 36 are preferably provided with a bevel 37 on the outer portion of the forward edge to provide a sharpened cutting edge 38 thereon. The bars are also preferably provided with a slight twist which permits the cutting edge 38 to lie in alignment with the inner surface 39 of the side members 31 and 32 of the frame 30, the rear portions of the bars being spaced outwardly from the axis of curvature of the screen to provide clearance between the cutter bars and the hammers of the rotor, thereby forming clearance behind the cutting edge 38 to expedite the cutting action thereof. This particular arrangement of blades on the bars will cut material moved by the rotor thereacross.

To further expedite the cutting action of the sharpened edges on the bars and to permit gradual shedding of material tending to ball upon or adhere to the bars, said bars are provided with a slope from their point of attachment to the side members 31 and 32 to their inner extremities toward the direction of travel of the rotor thereby providing shearing action of the material moved across said bars and to permit a gradual shedding or movement of said material therefrom to permit passage through the mill.

The concave screen is supported in the upper portion of the housing by means of spaced guide members 41 and 42 on each of the walls 3 and 4 to provide a guide slot 43 adapted to receive the side members 31 and 32 of the screen, said screen being adapted to be inserted in the slot 44 formed by the spacing of the end 12 of the member 11 and the wall 13 and moved through the guide until the member 33 engages the end 45 of the curved portion 15 of the housing. The screen is held in place by a stop 46 closing the slot 44 through which the screen is inserted.

The operation of an ensilage cutter or hammer mill and a screen associated therewith constructed as described, is as follows:

Ensilage of either dry or wet character, such as green feed, wet corn fodder, and/or grasses, to be comminuted are applied to the housing of the mill through a conventional feed opening (not shown) to the interior of the chamber formed in the mill by the chamber forming plate 15. The drive shaft 22 for the rotor is rotated in a clockwise direction, Fig. 1, by suitable driving devices whereby centrifugal force generated in rotating the rotor holds the ensilage within the confines of the rotor chamber and against the inner face of the chamber forming wall 15, where the hammer blades 29 come into play to finely chop and grind the ensilage into minutely comminuted particles. Centrifugal action of the rotor also causes the members 30 to act as fan blades for blowing the comminuted ensilage around the housing formed by the plate 15 and out through the screen 18 into the discharge outlet 14 for subsequent disposition in a hopper or other collecting device. The larger pieces of the material are directed against the sharpened edges 38 of the bars to further comminute same as they pass into the outlet 14. The green feed, corn fodder and the like usually include twine and hard fibrous material which, when thrown against the bars 36 by the centrifugal force of the rotor, tend to adhere to said bars and gradually ball up and clog the opening 35 of said screen, thereby interfering with the proper passage of the

comminuted material to the discharge opening 14.

With the present type of screen, the twine or fibrous material, which is snagged by the respective bars of the screen, is moved along the forward edge of said bars by the movement of the rotor due to the sloping of said bars from the side members 31 and 32 to the inner extremities of the bars in the direction of rotation of the rotor. This movement of the twine and other material provides a shearing action which cuts said material and permits its discharge from the mill, thereby eliminating any possible obstruction, balling up, or clogging of the screen, from obstructing passage of the cut material there-through. Even if the material caught on the blade of the screen is not cut by movement thereover, it is readily shed from the end 40 of said blade, thereby eliminating any obstruction in the screen.

It is apparent, therefore, that the present invention provides an improved screen for ensilage cutters or hammer mills that is convenient, economical, highly efficient and admirably suited for the accomplishment of the results for which it is intended, and that it is capable of retarding or retaining the feed in the mill during grinding thereof without danger of balling up or clogging with twine or other fibrous material in the material being ground.

What I claim and desire to secure by Letters Patent is:

1. In a device of the character described, a housing having an outlet, a rotor including hammers rotatable in the housing for reducing material therein, a concave screen covering the housing outlet for retarding material being ground in the housing, said screen including spaced curved members, and bars spaced on the curved members and extending laterally therefrom in the direction of rotation of the rotors and terminating in spaced free ends, the bars on one curved member being staggered relative to the bars on the other curved member, said curved members and bars defining openings in the screen for passage of material ground in the housing.

2. In a feed grinder, a rotor including hammers rotatable in the grinder for reducing material therein, an arcuate member forming a portion of the wall of said grinder, said arcuate member including end and curved side members forming an opening therein, and bar segments having a knife-like edge extending laterally of the curved side members and into the opening in the arcuate member for cutting the material moved there across by the rotor, said bars on one side member being staggered relative to the bars on the other side member and having free ends substantially at the median arc of the arcuate member.

3. In a device of the character described, a housing having an outlet, a rotor including hammers rotatable in the housing for reducing material therein, a screen including a frame covering the housing outlet for retarding materials being ground in the housing, bar segments on the frame extending and sloping therefrom in the direction of rotation of the rotor, said bars on one side being staggered relative to the bars on the other side member and having free ends substantially at the median line of said screen, and a knife-like edge on the respective bars for co-operating with the hammers of the rotor for cutting the material in the housing.

4. In a device of the character described, a

housing having an outlet, a rotor including hammers rotatable in the housing for reducing material therein, an arcuate screen including a frame covering the housing outlet for retarding materials being ground in the housing, and bar segments on the frame extending laterally thereof and sloping therefrom in the direction of rotation of the rotor, said bar segments on one side member being staggered relative to the bars on the other side member and having free ends substantially at the median arc of said screen, and having knife-like forward edges and clearance on the rear edges thereof for cooperating with the hammers of the rotor in cutting the material in the housing.

5. In a device of the character described, a housing having an outlet, a rotor rotatable in the housing, a screen covering the outlet for retarding material being ground in the housing, said screen consisting of a frame including curved side members, and bar segments extending laterally from said side members and sloping therefrom in the direction of rotation of the rotor, said bars on one side member being staggered relative to the bars on the other side member and terminating substantially at the median arc

of the screen, said bars each having a forward edge sharpened to expedite cutting of the material in the housing.

6. In a device of the character described, a housing having an outlet, a rotor rotatable in the housing, a screen covering the outlet for retarding material being ground in the housing, said screen consisting of a frame including curved side members, and bar segments extending laterally therefrom in the direction of rotation of the rotor, said bars terminating substantially at the median arc of the screen and sloping from said side members, said bars having a knife-like edge projecting counter to rotation of said rotor to expedite cutting of the material in the housing.

7. In a device of the character described a concave screen for retarding material being ground including a frame, and bars spaced on said frame and arranged in staggered relation, having their inner ends terminating at substantially the median arc of said frame, said bars having sloping side faces forming knife-like edges projecting in a direction counter to movement of said material.

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