Aug. 15, 1939. J. A. ERICKSON 2,169,684

HAMMER MILL

Filed Oct. 8, 1936 4 Sheets-Sheet 1

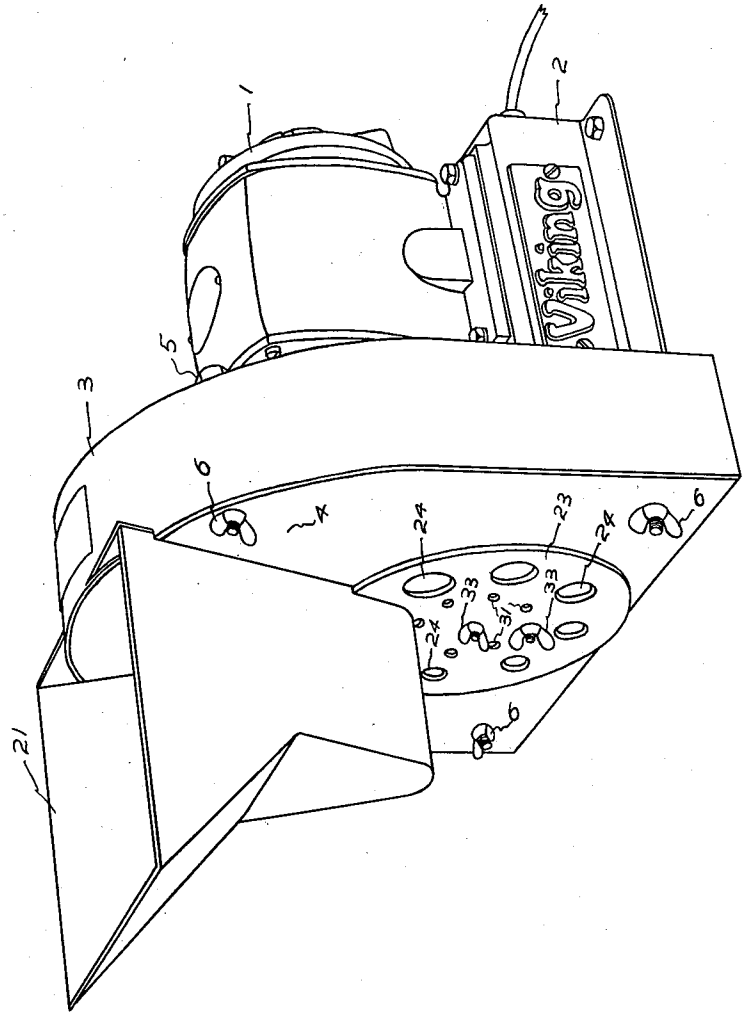

Fig. 1

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HAMMER MILL

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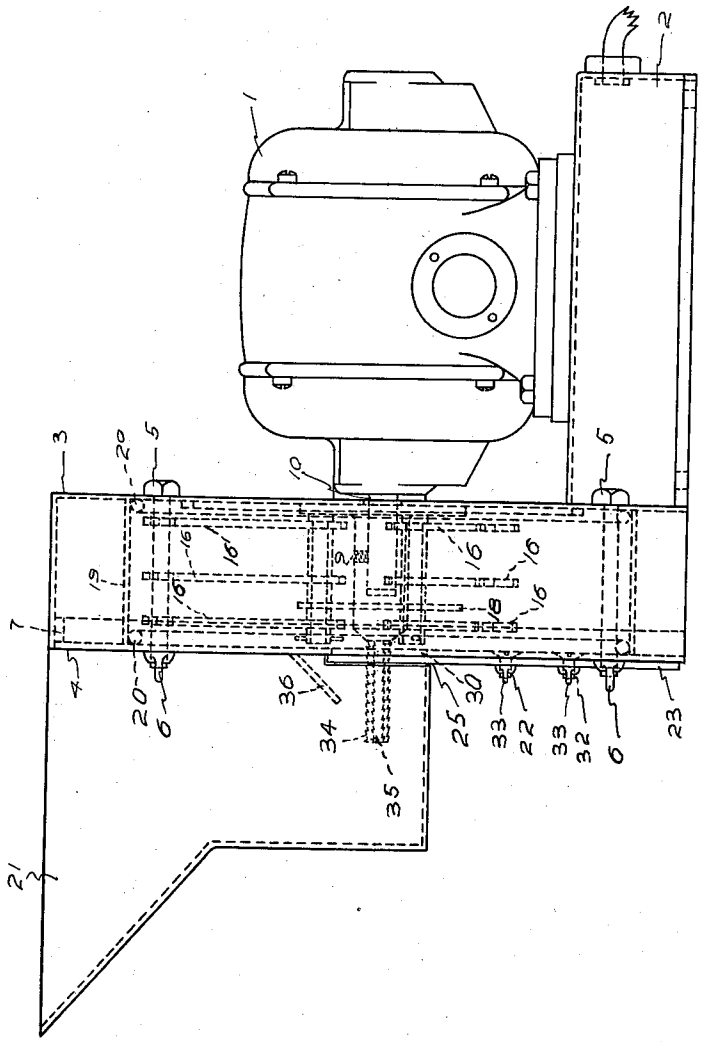

Fig. 2

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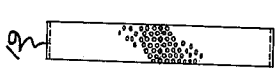

Fig. 5

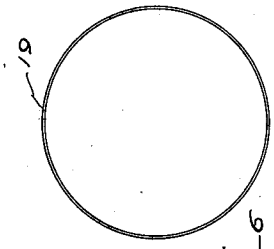

Fig. 4

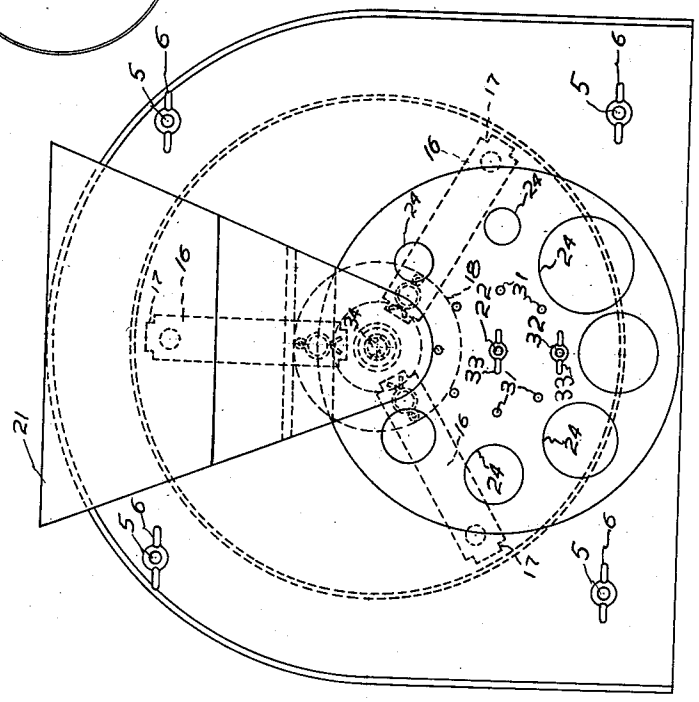

Fig. 3

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HAMMER MILL

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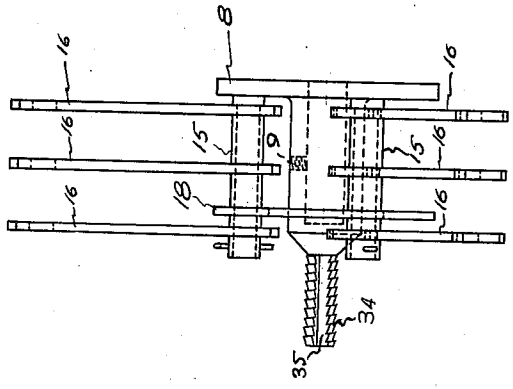

Fig. 7

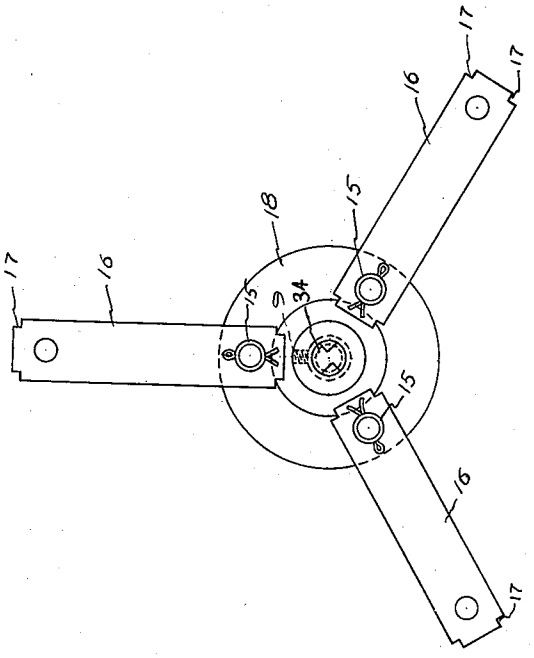

Fig. 6

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UNITED STATES PATENT OFFICE

2,169,684

HAMMER MILL

John A. Erickson, Jackson, Mich.

Application October 8, 1936, Serial No. 104,635

3 Claims. (Cl. 83—11)

This invention relates to hammer mills and more particularly to such mills for grinding grains, coal, rock and like materials.

Present minimum size hammer mills have required four or five horse power to operate them and consequently for many purposes such as for grinding flour and stock feed on the farm have been uneconomical to operate. The nonexistence of small hammer mills can be greatly attributed to the lack of a proper feeding device so that the material to be ground or pulverized can be fed into the mill in a slow constant stream within the capacity of the mill to grind it.

An object of the invention is then to provide a relatively small hammer mill having a feeding mechanism capable of providing a regulated constant stream of material to be acted upon.

Another object is to provide a novel feeding mechanism.

A further object is to provide a hammer mill which will not become stopped up by foreign matter.

These and other objects will be apparent from the following specification when taken with the accompanying drawings in which

Fig. 1 is a perspective view of the complete mill showing the feeding disc on the front of the mill with the different size holes for the feed,

Fig. 2 is a side view of the complete mill, showing by means of dotted lines the hammers, the screen, the feed screw and the straw baffle in the feed hopper,

Fig. 3 is a front view of the machine,

Fig. 4 is a side elevation of the screen,

Fig. 5 is an end elevation of the screen,

Fig. 6 is a side elevation of the hammer assembly, and

Fig. 7 is an end elevation of the hammer assembly.

Referring particularly to the drawings, reference character 1 indicates an electric motor mounted on a base 2. Suitably secured as by welding to the base 2 is a mill housing 3 having a removable front cover 4 secured to the housing 3 by bolts 5 and wing nuts 6. The cover 4 abuts against a bar 7 fixed to the housing 3 just inside the opening side thereof.

Within the mill 3 is disposed a rotor hub 8 shown particularly in Figs. 3 and 4 secured by a set screw 9 to the shaft 10 of the motor 1 for rotation thereby. From the hub 8 axially project three radially spaced hammer supporting bars 15. On each of the radially spaced bars 15 are loosely pivoted hammers 16 having at their outer ends shoulders 17 to provide additional corners to facilitate the breaking of the material being acted upon during the operation of the mill. As the hub 8 is rotated by the motor 1 the hammers 16 project radially due to centrifugal force. It will be observed that the hammers 16 are pivoted from either end so that they may be reversed upon the wearing down of one end to effect a replacement economy. The outer ends of the bars 15 are restrained against radial movement by a ring 18.

Surrounding the hammers 16 is a removable screen 19 by which the material being acted upon is maintained in the path of the hammers 16 and through which the ground material passes. The screen 19 is supported with respect to the hammers 16 by rings 20 secured to the inner side of the housing 3 and of the cover 4, as shown particularly in Fig. 2. There may be provided several screens 19 each having openings of a different size and one may be substituted for the other by removing the cover 4, it being understood that the size of the screen selected determines the size to which the material acted upon is ground.

One of the disadvantages of prior hammer mills is that the feeding of the material to be acted upon has been from the periphery. This method of feeding made it impossible to correctly gauge the amount of material fed to the mill for most efficient grinding. For instance, if too much or too little material is fed per unit of time, more power is required per unit amount of material ground than if the material to be acted upon is fed at the correct rate. It will be obvious that the specific amount of material to be fed to the mill per unit of time varies with the coarseness to which the material is to be ultimately ground.

According to the present invention material is fed to the mill at the axis of rotation of the hammers 16 through various size inlets. To one side of the cover 4 is secured a feeding hopper 21. Pivoted to the cover 4 about a screw 22 is a feeding disc 23 having perforations 24 graduated in size. It will be observed in Fig. 2 that the hopper 21 is provided at its lower end with a recess 25 to permit the disc 23 to move between it and the cover 4, so that the graduated perforations 24 may be moved successively into alignment with an opening 30 in the center of the cover 4 to provide a direct passage from the hopper 21 to the interior of the mill housing 3. Disposed on a radial line between the screw 22 and the perforations 24 are a series of perforations 31 through one of which projects a screw 32 to hold the disc 23 in adjusted position. When the adjustment

has been made wing nuts 33 on the screws 22 and 32 maintain the disc 23 in adjustment.

Projecting from the hub 8 through the opening 30 in the cover 4 and a perforation 24 in the disc 23 into the hopper 21 is a feeding screw 34. The threads on the screw 34 are cut so that the face on their mill side extends substantially radially to obtain a maximum feeding action. In order to break up any large size lumps of foreign matter finding its way into the hopper 21 the feeding screw 34 is provided on each side with an axially extending groove 35, shown particularly in Figs. 1 and 5.

When grain such as wheat is being ground it not infrequently happens that straw enters the hopper 21. Should the straw lodge lengthwise across an opening 24 it would clog the inlet, preventing a part or all of the grain from entering the mill. To overcome this possibility a downwardly inclined baffle plate 36 extends into the hopper 21 and over the inlet to the mill. Thus any straws which would be likely to lodge across the inlet to the mill are deflected outwardly so that they enter the inlet lengthwise due to the feeding action of the screw 34 and the suction caused by the action of the hammers 16.

It will be obvious from the foregoing description that for a screen 19 of predetermined size permitting ground material of a predetermined size to pass therethrough, an opening 24 may be selected to permit the correct amount of grain or other material to be fed per unit of time, for most efficient operation. It will be also obvious that due to the high rate of rotation of the hammers 16, a suction will exist at the inlet to the mill which will assist the screw 34 in feeding material to be acted upon.

The present hammer mill is particularly advantageous for use on farms, for its initial cost is not only small, but it may be used for grinding grain for flour as well as feed for stock. Furthermore, because of its automatic feed it is not necessary for the operator of the mill to attend it during its operation. It is especially true when grinding feed for stock, at which time the farmer may be taking care of his other duties about the farm.

Having thus described my invention what I desire to protect by Letters Patent and claim is:

1. A hammer mill comprising a housing, a rotor disposed therein, means to rotate said rotor, a plurality of hammers connected to said rotor, a removable screen in said housing for determining the texture to which the material to be acted upon is ground, a hopper having an outlet for holding the material to be acted upon by said mill, an adjustably mounted feeding means adjacent said outlet having a plurality of inlet ports any one of which, by adjusting said feeding means, may be disposed between said hopper and said housing for admitting the material to be acted upon into said housing from said hopper, said inlet ports being of different sizes, and a screw in said hopper for feeding the material therein through the active inlet port into said housing, whereby, by adjusting said feeding means, an inlet port of predetermined size may be selected for active use depending upon the mesh of the screen used in said housing.

2. A hammer mill comprising a housing having a removable side, a rotor disposed in said housing, means to rotate said rotor, a plurality of hammers connected to said rotor, a hopper for holding material to be acted upon by said mill secured to said removable side, an opening in said removable side opposite a lower portion of said hopper, a feeding screw projecting from said rotor into said hopper and adjustable means defining a plurality of inlet ports of different sizes associated and movable with said removable side each arranged to be separately and selectively disposed between said opening and said hopper, said feeding screw projecting through the active inlet port and said side being removable for the purpose of removing said adjustable means from over said feeding screw for permitting adjustment of the same.

3. A hammer mill comprising a housing having a removable side, a rotor disposed in said housing, means to rotate said rotor, a plurality of hammers connected to said rotor, a hopper for holding material to be acted upon by said mill secured to said removable side, an opening in said removable side opposite a lower portion of said hopper, means defining a plurality of inlet ports of different sizes associated with said removable side each arranged to be separately and selectively disposed between said opening and said hopper whereby the inlet from said hopper into said housing may be adjusted, and a feeding screw having a driving connection through the active inlet port with said rotor, disposed in said hopper, for feeding the material from said hopper through the active inlet port and said opening in said removable side of said housing into said housing, whereby when the size of the inlet port into said housing from said hopper is to be adjusted, said removable side of said housing is removed to permit the adjustment without interference from said feeding screw.

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