M. F. WILLIAMS.

GENERAL GRINDER.

APPLICATION FILED MAY 9, 1914.

1,258,969. Patented Mar. 12, 1918.

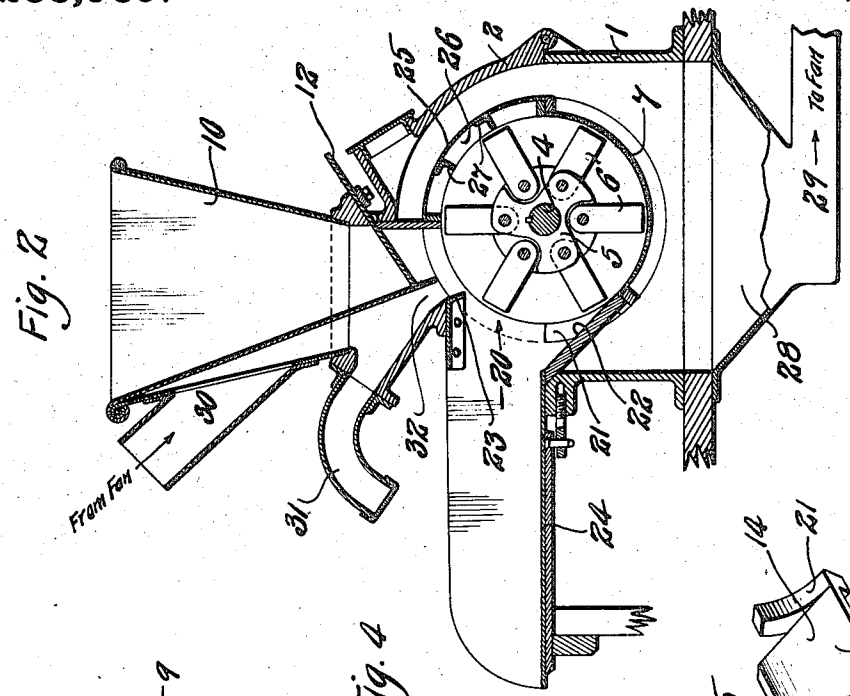


Fig. 2

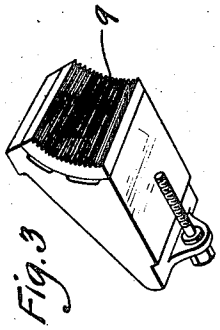


Fig. 3

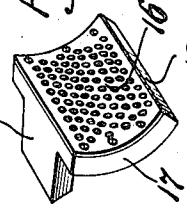


Fig. 4

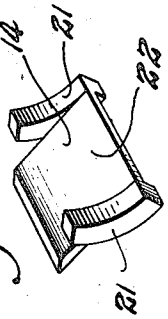


Fig. 5

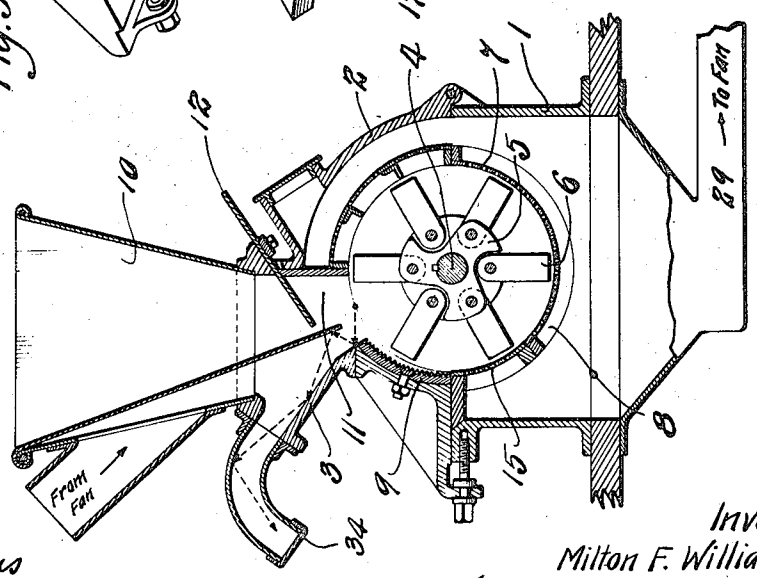


Fig. 1

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UNITED STATES PATENT OFFICE.

MILTON F. WILLIAMS, OF ST. LOUIS, MISSOURI, ASSIGNOR TO WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

GENERAL GRINDER.

1,258,969. Specification of Letters Patent. Patented Mar. 12, 1918.

Application filed May 9, 1914. Serial No. 837,445.

To all whom it may concern:

Be it known that I, MILTON F. WILLIAMS, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in General Grinders, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates broadly to mills or pulverizers of the rotary hammer type, and has as its general object the provision of a durable and efficient grinder adapted for usage such as the reduction of granular material, like grain, bones, fertilizer, etc., or fibrous material, such as alfalfa, pea hay, corn stalks, etc.

More specifically, the invention relates to certain improvements in rotary hammer mills whereby certain parts of the mill are interchangeable for the purpose of adapting it to different uses, and also whereby the capacity or reducing efficiency of the mill is increased.

Other and further objects of my invention will be obvious or hereinafter pointed out, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 represents a sectional elevation showing a mill arranged for the reduction of granular material.

Fig. 2 is a sectional elevation showing the mill arranged for the reduction of fibrous material.

Fig. 3 is a perspective of the granular breaker plate.

Fig. 4 is a perspective of the interchangeable cage section.

Fig. 5 is a perspective of the breaker plate for fibrous material.

By reference to the drawings in detail, it will be understood that 1 represents the machine casing, 2 a cover which may be suitably hinged thereto. Secured to the cover 2 is a throat casting 3 provided with separate inlet openings for the purposes hereinafter to be described. 4 is a rotary shaft carrying the hammer mounts 5, upon which are pivoted the hammers 6.

In Fig. 1, 7 represents the grinding cage which may be of any desired sort, the same being suitably mounted on the frame 1, preferably by means of the side frames 8 which rest on proper seats formed in the end walls of the casing. A breaker plate 9 is adjustably mounted on the frame 1 in position to coöperate with the hammers 6. Material is fed to the action of the mill from the hopper 10 through the throat 11, the feed being controlled by a suitable valve 12.

The parts so far described are all well known in the art, and need not be described further in detail.

The machine as illustrated in Fig. 1 is suitable for the reduction of such materials as can be fed into the grinding chamber from the hopper 10. Such materials, of course, are limited to those which will feed freely, due to their form, size, or weight, such as grain, rock, commercial fertilizer, and similar materials, which for the purpose of designation, I will arbitrarily term "granular materials." This arrangement is not adapted, however, to the reduction of the sorts of materials which I will arbitrarily designate "fibrous materials," such as alfalfa, pea hay, corn stalks, and similar more or less comparatively light and bulky materials which are not adapted to feed to the action of the beaters from the hopper 10. To accommodate the mill to both uses, a very important consideration in mills of this sort which are designed for sale to farmers who have a wide variety of uses for it, the mill is equipped with the substitite breaker plate 14 and the removable cage section 15. The removable cage section 15 is disposed intermediate the breaker plate 9 and the cage 8, forming substantially a continuation of the latter. As illustrated, the removable cage section has the screen 16 carried on the end frames 17, which rest in suitable seats on the side walls of the casing 1, the cross frame 18 which is designed to contact with the terminal cross frame of the cage 8, and the top plate 19 which extends to the front wall of the casing 1, and forms a suitable supporting surface for the mounting of the breaker plate 9. The removable cage section may be inserted or removed by swinging back the cover on its hinge, whereby access to the interior of the mill is afforded.

When it is desired to equip the machine

for the reception of the so-called "fibrous materials," the breaker plate 9 and its mounting are removed, thus leaving the front feed opening 20. The removable cage section 15 is removed, and in its place is substituted the substitute breaker plate 14. The substitute breaker plate is formed with the lateral supports 21 which are designed to rest in the same seats on the side walls of the casing 1 which support the side frames 17 of the removable cage section. On the lateral supports 21 is supported the impact plate 22, which, when in postion in the mill, extends from the forward edge of the cage 7 to the front wall of the casing 1, being inclined outwardly to form the bottom of the front feed opening 20.

In the place of the breaker plate 9 is substituted a feed board or chute 24, which is suitably secured to the mill casing, and forms a guideway or chute through which the fibrous material may be fed through the front feed opening 20. A depending lip 23 is formed on the feed board 24 in position to extend across the top of the feed opening 20, the same operating to prevent material being thrown out of the feed opening 20 by the hammers.

The mill equipped as illustrated in Fig. 2, is adapted to reduce material which ordinarily will not feed with proper facility from the hopper 10, the arrangement providing a wide flaring feed opening through which the material readily passes into the grinding chamber. When so arranged, the feed hopper 10 is cut off from the grinding chamber by closure of the valve 12.

In the reduction of most material, and particularly in the reduction of light materials, such as grain, alfalfa hay, etc., there is a certain tendency of the material to race around with the beaters both before it is reduced sufficiently fine to pass through the cage or screen and after it is sufficiently reduced, the whirling of the beaters tending to hold the material in suspension. In order to prevent this racing of the material and to facilitate the passage of the reduced material through the screen, thereby increasing the capacity or grinding efficiency of the mill, I provide the upper or bolting screen 25 which is supported within the casing above the grinding cage 7 and disposed on a radius greater than that of the cage 7 relative to the shaft 4. Disposed at suitable intervals on the bolting screen 25, and extending thereacross between the side frames 26, I place the baffle plates 27, which project inwardly toward the shaft adjacent the orbital path of the beaters. The effect of these baffle plates is to produce eddies outside the orbit of the beaters, in which the light reduced material is carried beyond the rotary influence of the beaters and against the bolting screen 25 through which it passes out of the grinding chamber and into the discharge hopper 28.

The discharge hopper 28 has outlet to a suitable suction fan by way of the conduit 29, the arrangement being such as to provide a reduced pressure in the interior of the casing 1 which produces a suction from the interior of the grinding chamber through the cage and screen. The air is returned from the fan to the interior of the grinding chamber by way of the pipe 30, the arrangement tending to produce a pressure within the grinding chamber which finds outlet through the foraminous cage and screen. The baffle plates 27 coöperate in this arrangement, as above described, by enabling the reduced material to free itself from the racing influence of the rotating beaters. Likewise the baffle plates 27 provide places for lodgment of the unreduced material so as to prevent its being carried around ineffectively by the beaters.

From the foregoing, it will be seen that my invention relates to certain improvements in the structure of rotary hammer mills whereby the adaptability of the mill is greatly increased, and its grinding capacity increased.

I am aware that various changes and modifications in the forms illustrated and described may be made without departing from the spirit and scope of my invention, and therefore, it is not my intention that I be limited to the specific forms shown and described.

What I claim is:

1. In a grinder, the combination of a casing, rotary beaters, a foraminous cage within the casing adapted to hold material to the action of said beaters, said cage having its upper portion offset relative to its lower portion and spaced apart from the casing, a baffle plate extending from said offset toward the operating orbit of the beaters, and means for exhausting the air from the casing about the offset portion of the cage.

2. In a grinder, rotary beaters, a perforate cage mounted for coöperation therewith and having a portion offset from the beaters, a baffle plate mounted on the offset portion of said perforate cage in position to coöperate with said beaters, and a casing inclosing the cage and spaced apart from the offset portion thereof.

3. In a grinder, the combination of a casing, rotary beaters, a cage disposed within the casing for coöperation with said beaters, the upper portion of said cage being foraminous and offset relative to the orbit of the beaters and spaced away from the casing, and baffle plates mounted within said offset portion and having coöperative relationship with said beaters.

4. In a grinder, the combination of a cas-

ing, a forminous grinding cage mounted therein, a shaft carrying rotary beaters adapted to coöperate with said grinding cage to reduce material, baffle plates mounted on portions of said foraminous grinding cage adjacent the orbit of said beaters, and means for exhausting air from the casing.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 24th day of April, 1914.

MILTON F. WILLIAMS.

Witnesses:
M. P. SMITH,
C. S. BUTLER.