M. F. WILLIAMS.

CAGE FOR REDUCING MACHINES.

APPLICATION FILED OCT. 18, 1920.

1,408,055. Patented Feb. 28, 1922.

Fig. 1.

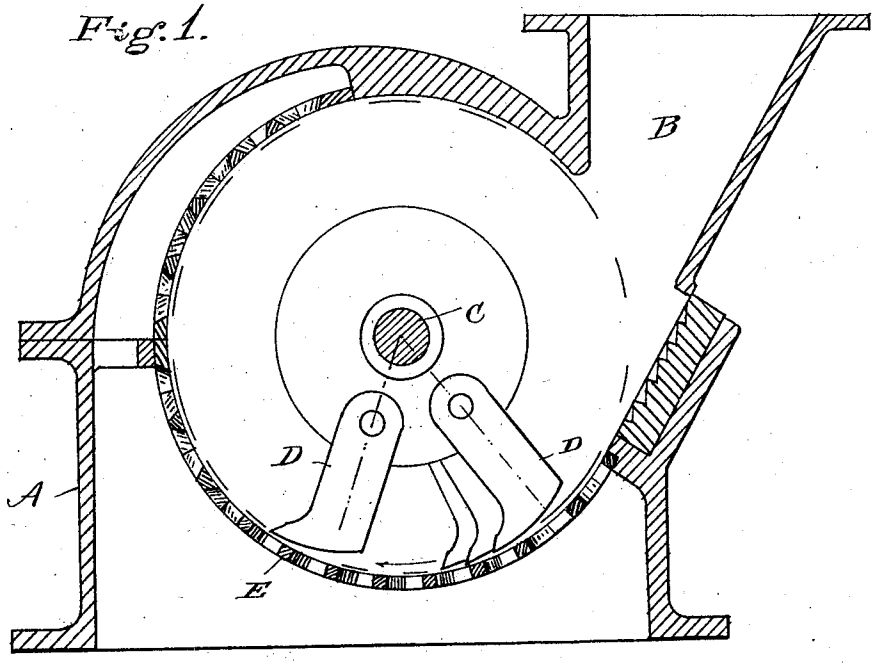


Fig. 3.

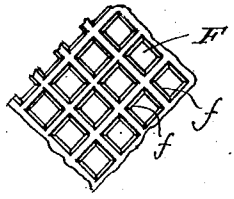
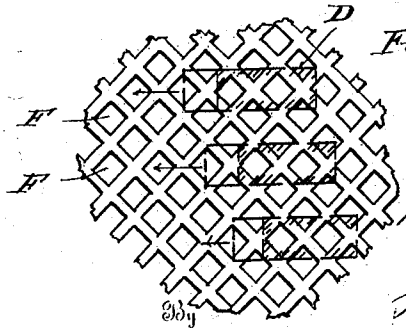


Fig. 2.



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CAGE FOR REDUCING MACHINES.

1,408,055. Specification of Letters Patent. **Patented Feb. 28, 1922.**

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To all whom it may concern:

Be it known that I, MILTON F. WILLIAMS, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Cages for Reducing Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in cages for reducing machines the peculiarities of which will be hereinafter fully described and claimed.

The main object of my invention is to provide an arcuate plate cage having discharge openings with converging cutting edges at the inner face of the plate, which edges co-operate with suitable hammers to provide a positive shear cut on wheat, oats, screenings and like material fed to it.

In the accompanying drawing on which like reference letters indicate corresponding parts, Fig. 1 represents a vertical sectional view across the shaft and casing of a machine exemplifying my invention; Fig. 2 a plan view of a portion of a cage of my construction, viewed from the inside and with the path of the hammers indicated and the direction thereof; and Fig. 3 a similar view of the underside of said cage showing the bevel edges of the openings through which the material is discharged.

In machines of the class to which my invention is applicable it is desirable that the wheat, oats, screenings and like material be ground with a shear cut that is positive in its action and I provide such a cage in this application.

Referring to the drawing the letter A designates the casing of a grinding mill having a hopper B, a shaft C and rotary hammers D mounted on said shaft. These hammers are of any suitable construction and shape, but are preferably of the form shown in the drawings and having a cutting edge parallel to the axis of the shaft C and drawn forward with respect to the axis of the hammer so that the cutting edges operate in close proximity to a cage E. This cage in my construction is preferably of plate metal punched or perforated as later described, and bent up into an arcuate form corresponding to the hammer circle of said hammers which co-operate therewith. The plate E has discharge openings which are preferably of a rectangular shape and marked F. They may be of other angular shapes. The essential feature of such construction is that at least two of the edges forming the angular discharge opening in each case, are inclined to one another and converging in the direction of rotation of the hammers. The object of this is in order that the material seeking escape through said openings may be retarded by the converging angle sides of the opening until the hammer passing in close proximity to the opening, shears the material on the cutting edges that are all in the plane of the inner face of the cage while it is thus held in the angle of the discharge opening. When it is finally divided enough to pass, it will be discharged through the opening. Fig. 2 shows the inner face of such a cage and the path of the hammers is indicated thereon, with the direction of movement by means of arrows. It will be seen that the cutting edges of the hammer lying parallel to the axis of the shaft are also disposed to act with a shearing cut upon the angle sides that are all in the plane of the inner face and are diagonally disposed to said cutting edges. Also that these converging, slantingly disposed edges of each opening, meet at the apex of an angle, the base of which is formed by the forwardly moving, transverse cutting edge of an adjacent hammer, which base decreases as it approaches said apex and shears interposed material held by the apex.

The underside of said cage is indicated in Fig. 3 wherein it is shown that the size of the openings is larger on the outer face than on the innerface, and thus a bevel *f* is given to the openings by which a sharpened edge is provided at the inner face, which edge is less than a right angle. In both instances, whether the discharge openings are made practically of the same size at the inner and outer faces, or whether the openings increase in size outward as in Fig. 3 and Fig. 1, the cutting edges of the inner face are located practically in the plane of the inner face of the cage and the path of the hammers is in close proximity to this inner face. Fig. 1 indicates a cage made with discharge openings that are formed straight through the cage at one portion, and are increased in size outward as above described for another portion of the

cage. Such forms of openings may be made in one cage as shown in Fig. 1, or may be provided for different cages as occasion arises. Some material is better ground with a square edge for the openings in the cage while other material is better reduced by a sharpened edge on the openings F.

The size of the openings may be suited to the material reduced and may vary accordingly, but the angular disposition of two converging sides of the discharge opening forming cutting edges that tend to act with a shearing action and to retain the material while being operated on by the cutting edges of the hammers, is maintained in all cases.

These converging cutting edges are located on the far side of the discharge opening with respect to the direction of movement of the hammers. When the cage is provided with rectangular discharge openings disposed with their converging edges diagonally to the cutting edges of the hammers, the cage may be reversed end for end after the cutting edges of the far side of the opening in one direction are worn out; when reversed the cage will present converging cutting edges at the opposite side of the opening which are not used for cutting when they are forming the near side of the opening. When reversed however, the converging far side of the opening becomes the near side, and the converging near side in its reversed position becomes the far side of the opening.

I claim:

1. The combination with rotary hammers, of a plate cage curved according to the hammer circle and having angular discharge openings therethrough, each of said openings having two sides that converge toward each other, and each side extends slantingly transverse to the planes of rotatiton of the hammers forming converging cutting edges in the plane of the inner face of the cage for each opening and located at the far side of each opening with respect to the movement of said hammers.

2. The combination with rotary hammers, of a plate cage curved to correspond with and to lie in close proximity to the hammer circle and having angular discharge openings therethrough,—each of said openings having two converging sides diagonally disposed with regard to the planes of rotation of the hammers, and meeting in a sharp angle and forming converging cutting edges in the plane of the inner face of the cage, and located at the far side of said openings with respect to the movement of said hammers.

3. The combination with rotary hammers, of an arcuate plate cage having angular discharge openings therethrough,—said openings having two sides extending transversely to the planes of rotation of said hammers, and converging to the far side with respect to the rotation of said hammers, and beveled on the underside forming inward cutting edges less than a right angle on said converging sides of said discharge opening.

4. The combination with rotary hammers, of an arcuate plate cage having angular discharge openings therethrough,—said openings having two converging sides slanting to the path of the hammers and meeting to form angles on the far sides and also having two other converging, reversely slanting, meeting sides on the near sides of said openings with respect to the rotation of said hammers, forming cutting edges all lying in the plane of the inner face of the cage in either direction of rotation of said hammers, to allow reversing of said cage end for end.

5. The combination with rotary hammers having cutting edges transverse to the planes of rotation, of an arcuate plate cage disposed in close proximity adjacent to the path of said hammers and having angular discharge openings therethrough,—two sides of each opening converging forward and forming with the inner face of the plate cage cutting edges that are disposed diagonally with regard to the cutting edges of said hammer the converging, meeting forward sides of each opening forming the apex of a triangle, and the transversely moving cutting edge of the hammer forming the base of a decreasing triangle that engages the material to effect a positive shearing converging reduction in connection with said hammers.

In testimony whereof I have affixed my signature.

MILTON F. WILLIAMS.