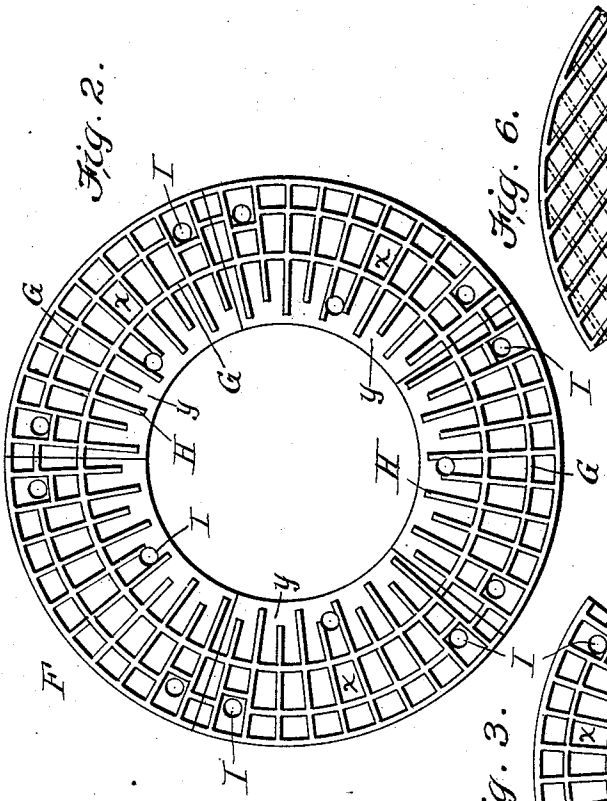
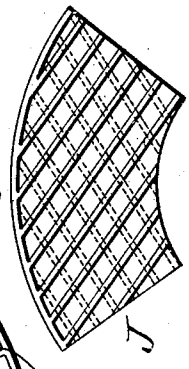
No. 874,764. PATENTED DEC. 24, 1907.

W. HALSTEAD.

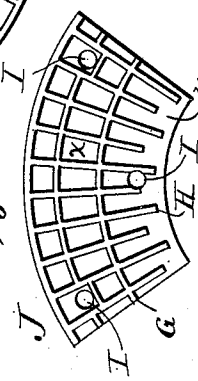
GRINDING MILL.

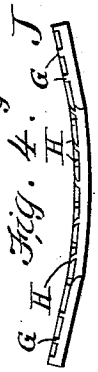
APPLICATION FILED DEC. 1, 1904.



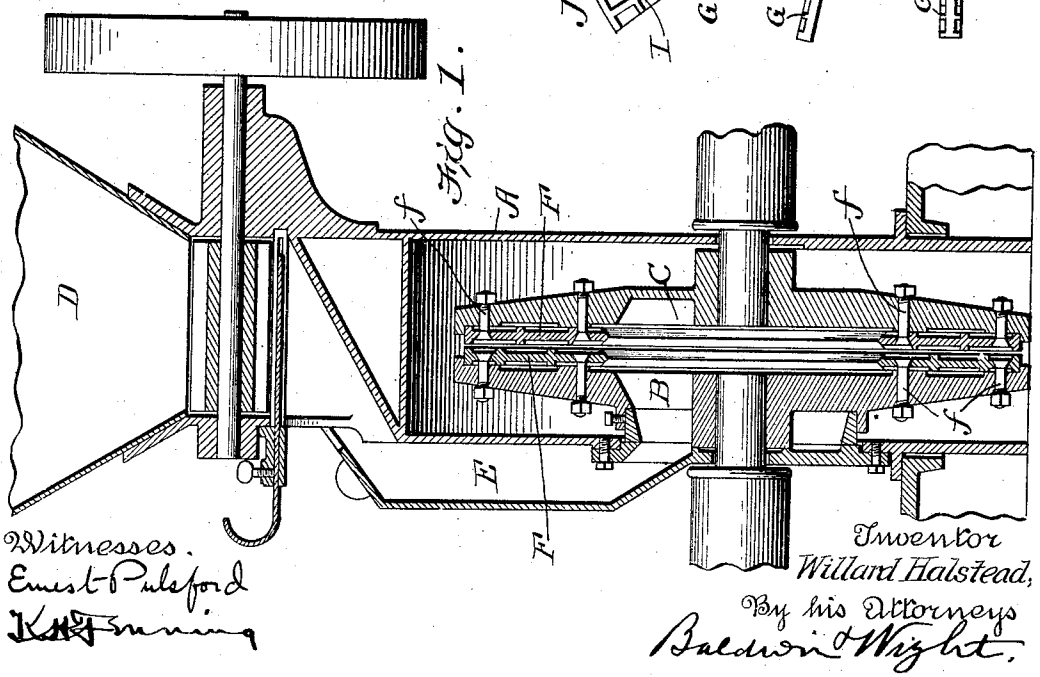












Witnesses.
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UNITED STATES PATENT OFFICE.

WILLARD HALSTEAD, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE ENGELBERG HULLER CO., OF SYRACUSE, NEW YORK, A CORPORATION OF WEST VIRGINIA.

GRINDING-MILL.

No. 874,764. Specification of Letters Patent. Patented Dec. 24, 1907.

Application filed December 1, 1904. Serial No. 235,066.

To all whom it may concern:

Be it known that I, WILLARD HALSTEAD, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention relates to grinding mills of the class generally known as "attrition mills," which are used for grinding corn and other grain. In this class of mills the grinding surfaces are usually formed by segmental metallic plates which are attached to opposing "grinding heads" in such manner as to form grinding disks that revolve rapidly in opposite directions. The grinding surfaces of these disks usually consist of concentric annular ribs intersected by radial ribs with intervening recesses or depressions. Often the opposing disks are brought quite close together and it is important that the surfaces of the disks should be straight and even, so that they may revolve without interference the one with the other and in order that the grain may be properly ground.

Heretofore it has been customary to cast ribs on one side only of each segmental plate and to correct, when possible, the irregularities generally occurring by a grinding process. Fully fifty percent of the plates formed in the ordinary way are so warped and crooked that they cannot be used at all, while all of those fit for use have to be dressed or ground until they are perfectly true and even. These irregularities are caused by the fact that the castings in cooling radiate heat more rapidly from the ribbed side than from the plane side and thus are always concaved more or less on the ribbed side. I have discovered that this defect is entirely overcome by forming ribs on both sides of the plate, taking care that the ribs on one side be directly opposite the ribs on the other side. In this way the cooling on opposite sides is equal and the ribs when contracting pull to an equal extent and in the same direction on both sides of the plates. Hence a perfectly true casting is obtained. Furthermore plates formed with ribs on opposite sides, where the ribs are concentric and radial, are reversible: that is to say when the ribs on one side of the plate are worn out, the plate may be removed from the grinding head and reversed without necessarily disturbing the other plates on the head or plates on the opposing disk.

In the accompanying drawings: Fig. 1 is a vertical section of a well-known form of attrition mill, equipped with my improved attrition plates. Fig. 2 is a face view of one of the attrition disks made up of the segmental plates. Fig. 3 is a face view of one of the segmental plates. Fig. 4 is an end view of a plate-casting as it appears after cooling when ribs are formed on only one side of the plate. Fig. 5 is a similar view showing the condition of the casting when ribs are formed on opposite sides of the plate in the manner before stated. Fig. 6 is a face view of a plate where ribs are formed on opposite sides but where they are not directly opposite to each other. Fig. 7 shows the condition of such a casting after it has cooled.

In Fig. 1 A indicates the casing of an attrition mill; B and C are the grinding heads. D is the feed hopper and E the chute leading from the feed hopper to the grinding disks in the usual way. F indicates the grinding disks, and *f* the bolts by which they are attached to the grinding heads. The grinding disks are formed with a grinding surface such as is indicated in Fig. 2. It will be observed that there are concentric circular ribs G and radial ribs H with depressions or recesses *x*, *y* between them. The outer curved rib is arranged at the ends of the radial ribs and all the curved ribs project beyond the radial ribs at the ends of the plate. In this way the plate can be matched without producing a double width of radial ribs at the joints, and the outer series of recesses *x* are completely closed or surrounded by ribs. I indicates bolt holes for the bolts *f*. Preferably each disk is made up of five segments J of the form shown in Fig. 3. As before stated each plate or segment has the radial and curved ribs on one side directly opposite those on the opposite side in the manner indicated in Fig. 5. The molds are properly formed to produce such a plate and when the casting is cooled, the radiation on opposite sides of the plate will be equal and no warping or twisting of the plate will occur as would be the case if ribs were formed on one side only.

I claim as my invention:

1. A cast metal, reversible, segmental plate for attrition mills having a body portion of uniform thickness and formed with continuous or unbroken annular ribs and continuous or unbroken intersecting, straight,

radial ribs on both sides, the ribs on one side of the plate being directly opposite those on the opposite side thereof.

2. A cast metal, reversible, segmental plate for attrition mills having a body portion of uniform thickness and formed with annular, concentric, unbroken ribs, and intersecting, straight, radial ribs on both sides, the ribs on one side of the plate being directly opposite those on the opposite side and the outer curved ribs being at the extreme ends of the radial ribs while the inner ends of the radial ribs project inwardly from the inner curved ribs and are of different lengths.

In testimony whereof, I have hereunto subscribed my name.

WILLARD HALSTEAD.

Witnesses:
A. A. SCHENCK,
J. R. MONTAGUE.