M. F. WILLIAMS.

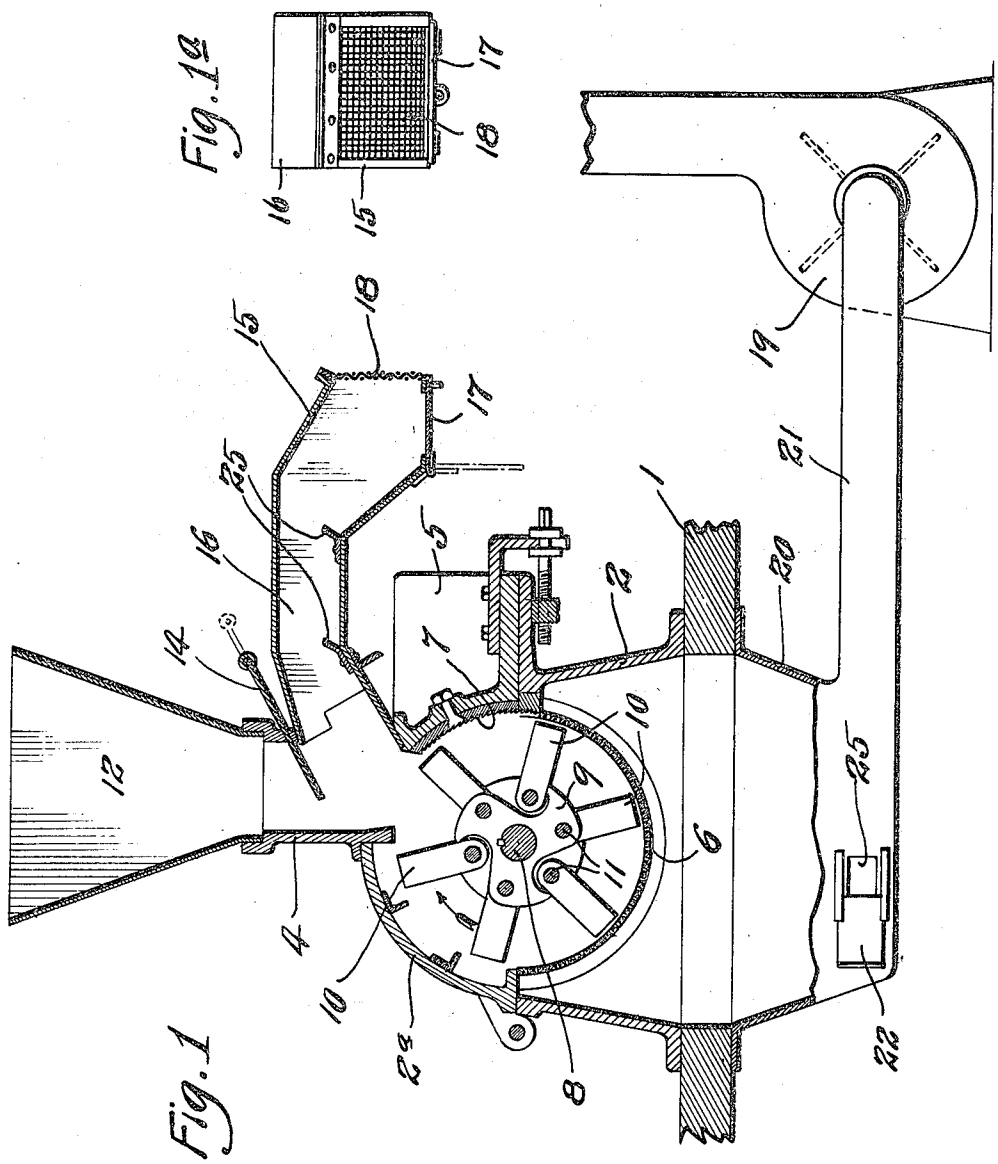
ROTARY MILL CONSTRUCTION.

APPLICATION FILED OCT. 28, 1915.

1,235,868.

Patented Aug. 7, 1917.

2 SHEETS—SHEET 1.



Inventor

Milton F. Williams

By F. C. Conners. Atty.

M. F. WILLIAMS.

ROTARY MILL CONSTRUCTION.

APPLICATION FILED OCT. 28, 1915.

1,235,868.

Patented Aug. 7, 1917.

2 SHEETS—SHEET 2.

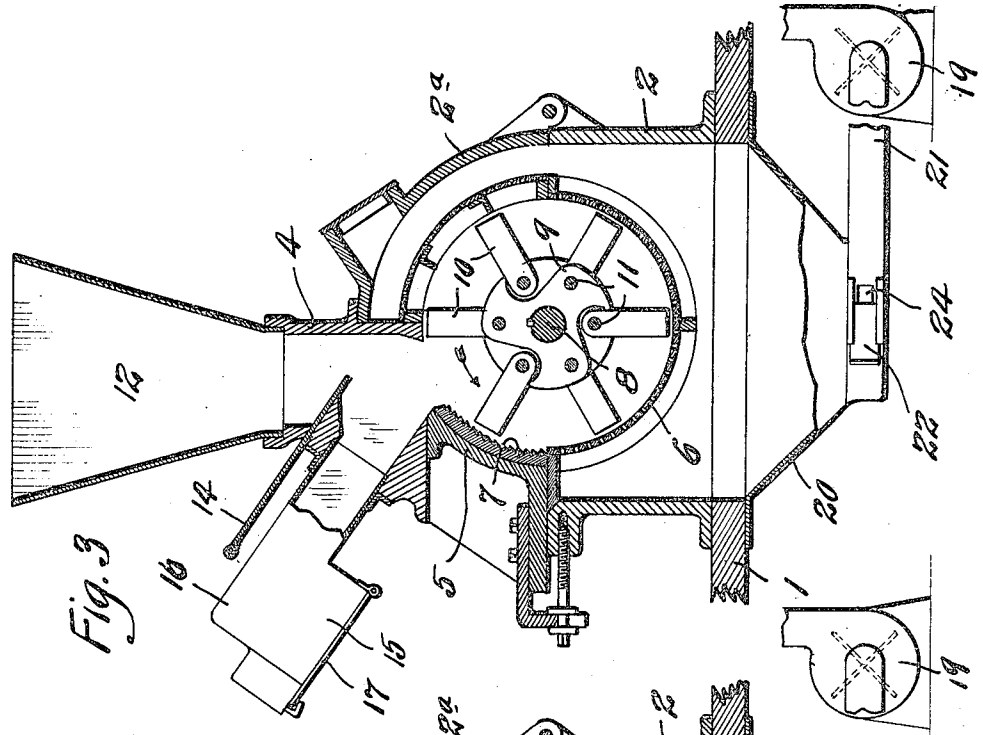


Fig. 3

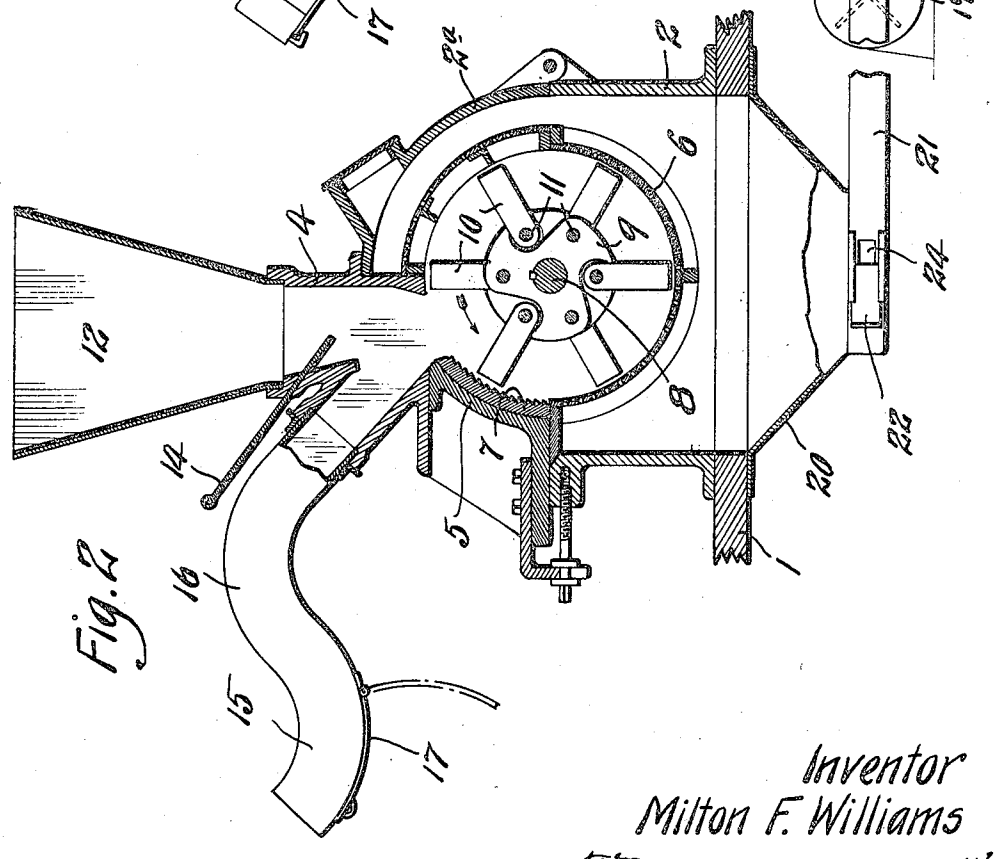


Fig. 2

Inventor
Milton F. Williams
By F. R. Conrad. Atty.

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.

ROTARY-MILL CONSTRUCTION.

1,235,868. Specification of Letters Patent. Patented Aug. 7, 1917.

Continuation of application filed May 9, 1914, Serial No. 837,445. This application filed October 28, 1915. Serial No. 58,376.

To all whom it may concern:

Be it known that I, MILTON F. WILLIAMS, a citizen of the United States, residing at city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Rotary-Mill Construction, 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.

This invention relates to certain improvements in grinders or rotary hammer mills and pertains more specifically to an improved means and arrangement of parts for effecting the extraction from the grinder of foreign material which may be inadvertently fed into the grinding chamber during the operation of the machine.

The object of the invention is to provide a very simple and at the same time very effective device which enables the mill to clear itself of such foreign or refractory material and thereby prevent injury to the mill or to the product

In the accompanying drawings—

Figure 1 is a vertical section through a mill of my improved construction transversely of the shaft;

Fig. 1ª is a detail front elevation of the receptacle for foreign material.

Fig. 2 is a vertical section showing a modified form; and

Fig. 3 is a similar vertical section showing a second modified form.

Certain of the subject matter of this application is disclosed in my copending application No. 837,445 filed May 9, 1914, and as to such subject matter this application is a continuation thereof.

By reference to the accompanying drawings, it will be understood that 1 represents a suitable platform upon which is supported the casing 2 of the mill. The casing 2 has a hinged cover portion 2ª upon which is carried a throat member 4. An adjustable breaker plate support 5 is movably mounted on the casing 2. As is readily understood by those skilled in the art, the casing with its cover and the movable breaker plate support form a housing, and within this housing is supported a concave foraminous grinding cage 6. A breaker plate 7 is suitably supported on the breaker plate support 5, and intermediate this breaker plate and the cover portion 2ª the throat casting 4 has communication with the grinding chamber formed by the cage, the breaker plate, the cover portion 2ª and the side walls of the casing. Through the grinding chamber so formed extends the shaft 8, and upon this shaft are keyed disks or hammer supports 9. Hammers or beaters 10 are pivotally mounted on said hammer supports by means of pivot bolts 11, and these hammers are of extent sufficient to permit their outer extremities coöperating with the breaker plate and the cage in the operation of the mill. Means is provided for rotating shaft 8 at a desired effective speed, and consequent upon such rotation, the hammers or beaters 10 will be caused by centrifugal force to assume a radial position such as that illustrated in the figures. In this position the hammers coöperate in the well known manner with the breaker plate and cage to break and reduce such material as may be fed to their action.

The material is fed into the grinding chamber through the throat casting 4 from the hopper 12, which is disposed vertically above the grinding chamber and to one side of the shaft 8. The flow of material from hopper 12 into the grinding chamber is controlled by an adjustable slide or gate 14 which may be moved outward or inward to increase or decrease the space for the passage of material down the side of the throat casting farthest removed from the breaker plate. On the far side of the throat casting in the direction of travel of the hammers is supported a receptacle 15 in the nature of a trap which communicates by means of a continuous closed conduit 16, with the interior of the throat casting and with the grinding chamber, the line at which the said conduit enters the throat casting being behind the opening by which material enters the grinding chamber from the hopper in the direction of travel of the hammers. At the end which enters the throat casting, the conduit 16 extends in a direction such that if extended it would subtend an arc of the circular orbit traversed by the operating ends of the beaters. After extending a short distance in a general upward direction, the conduit takes a horizontal and then

a downward course, terminating in the pocket or receptacle 15, the body portion of which lies below the intermediate portion of the conduit 16.

A gate 17 is provided in the bottom of the receptacle 15 which may be opened to permit the receptacle being emptied of such material as may be therein. The end wall 18 of the receptacle is formed of wire mesh which will permit the free passage of air, and which is sufficiently strong to resist the impact of material thrown thereagainst from the grinding chamber.

A centrifugal fan or blower 19 communicates with the discharge hopper 20 of the mill by means of a conduit 21 and said conduit or the discharge hopper is provided with a suitable gate or damper 22 which is movable to adjust the effective size of a draft opening 24.

In the operation of the machine, the shaft is rotated to revolve the hammers in the direction of the arrow as above described, and material is fed from hopper 12 past gate 14 through the throat opening and into the reducing chamber. Here the material is encountered by the hammers which carry it against breaker plate 7, subjecting it thereon to a preliminary crushing operation after which they carry it over the grinding cage 6 until it is reduced to particles of sufficient smallness to pass through the apertures in the cage. Meanwhile the blower 19 is operated to produce suction through the cage 6, which suction draws away the material as rapidly as it is reduced to sufficient fineness. This suction through the foraminous cage 6 also induces a suction into the grinding chamber through conduit 16, receptacle 15 and the open end thereof which is covered by the wire mesh 18. This suction or draft into the grinding chamber from conduit 16 is of sufficient force to prevent the material upon which the machine is designed to operate, such as grain or other feed stuffs of relatively light substance, from being thrown out into receptacle 15 by the hammers. Any heavy or refractory material, such as pebbles, pieces of metal and the like, which may be inadvertently fed into the machine, when struck by the hammers as it falls into the grinding chamber, will be propelled by the force of the blow from the hammers through the conduit 16 and into the receptacle 15, the momentum of such pieces of material being sufficient to prevent their being drawn back by the inward draft of air through the receptacle and conduit. In this fashion, such foreign objects will be immediately ejected from the grinding chamber and will not be subjected to the interacting operation of the hammers and breaker plate or the hammers and cage. Thus these operating parts in the machine will be protected from injury, and the product will be protected from such injury as might result from the commingling therein of crushed particles of such foreign material.

If desired, one or more baffle plates 25 may be inserted in the conduit 16 at various points between its mouth and the receptacle 15 so that in case any pieces of foreign material fall before they reach the receptacle, they will not be drawn back into the machine.

It will be observed that an important feature of the efficacy of this device as a protection for the machine, resides in the arrangement of the path of communication between the grinding chamber and the receptacle within an area intermediate the path of the material fed into the machine and the reducing concave of the grinding chamber, as such arrangement permits the projection of foreign material directly from the feed stream into the extracting receptacle.

In Figs. 2 and 3 are shown modified forms of the receptacle 15. In Fig. 2 the conduit takes a vertically sinuous course in the form of a reverse curve, the higher portion of which is intermediate the throat casting and the lower curved portion which forms the receptacle 15.

In the form illustrated in Fig. 3, the conduit 16 is straight, and at a suitable distance from the throat casting has its depth increased to provide the receptacle 15 which projects below the lower wall of the conduit. These forms, of course, are provided with the clean-out gate 17, and the device is equipped with other essential features including the fan 19 (shown diagrammatically) and the draft regulating means 22.

It will be understood, of course, that the purpose of the draft regulating damper 22 is to vary the amount of air admitted between the cage and the blower whereby to vary the strength of the draft through the cage and through the conduit 16.

I am aware that various changes and modifications may be made in the device herein illustrated and described, without departing from the scope and spirit of what I claim to be my invention.

What I claim is:

1. In a mill of the sort described, the combination of a grinding chamber, rotary beaters operating therein, a feed conduit disposed to feed material to said beaters in a substantially vertical stream, a conduit having communication with said grinding chamber adjacent the interior opening of the feed conduit, said conduit extending in a centrifugal direction from the orbit of the beaters and having an exterior opening for the admission of air, and means for drawing air into said grinding chamber through said conduit.

2. In a grinder, in combination, rotary beaters, a reducing surface, a feed conduit, and a receptacle for foreign material having communication with said beaters above the axis thereof and between the feed conduit and the reducing surface, and means for drawing a current of air into the mill through the receptacle.

3. In a grinder, the combination of a reducing chamber, rotary beaters mounted for operation therein, a feed conduit having communication with the reducing chamber at its upper portion above the axis of the beaters, an adjustable gate for regulating the effective cross sectional area of the feed conduit, a conduit for foreign material having communication with the feed conduit below the gate and above the reducing chamber and opening in the zone of centrifugal projection from the beaters, and a receptacle for foreign material having communication with said last mentioned conduit; said gate forming a deflector for guiding material into the last mentioned conduit.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this thirteenth day of October, 1915.

MILTON F. WILLIAMS.

Witnesses:
TALETA MICHAELIS,
LLOYD MEYERS.