2 Sheets--Sheet 1.

E. TOTMAN.

Grinding-Mills.

No. 150,731. Patented May 12, 1874.

Fig. 1

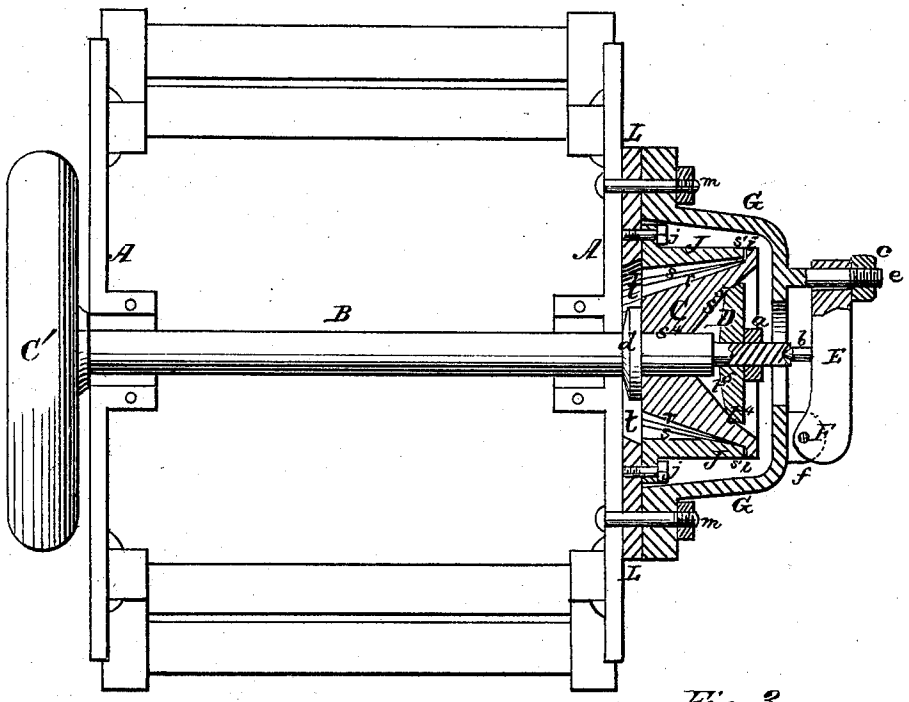


Fig. 2

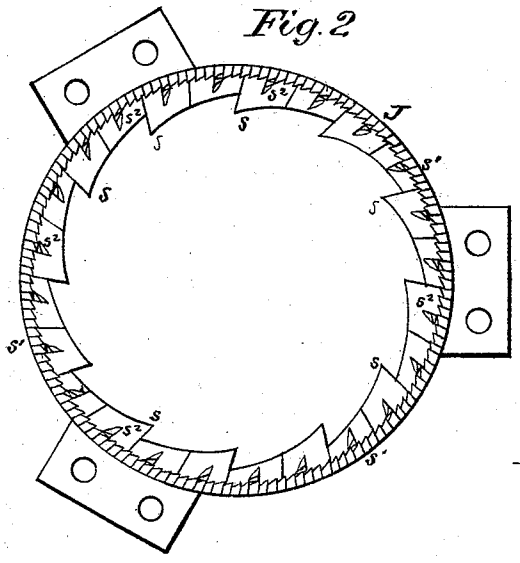


Fig. 3

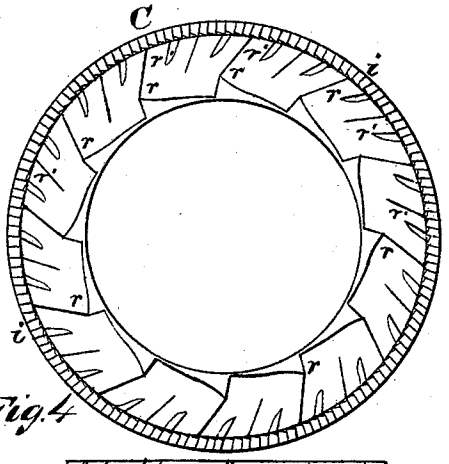
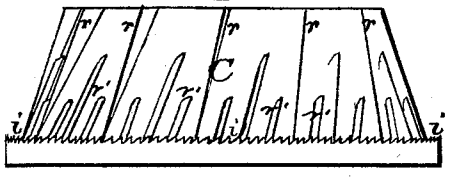


Fig. 4



Witnesses.
R. F. Campbell
J. H. Rutherford.

Inventor
Edsell Totman
by his attys
Mann Stewick & Lawrence

2 Sheets--Sheet 2.

E. TOTMAN.

Grinding-Mills.

No. 150,731. Patented May 12, 1874.

Fig. 5

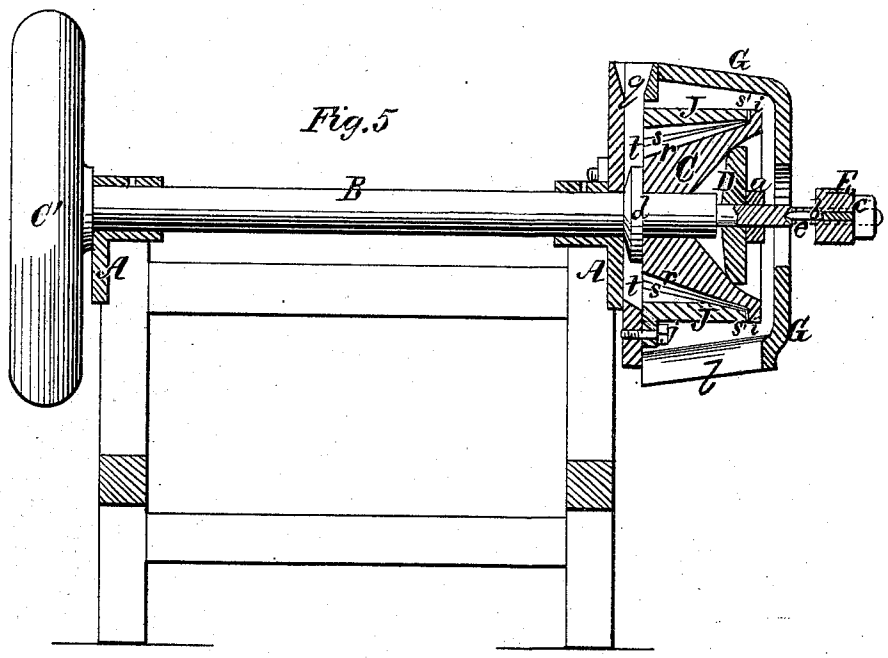
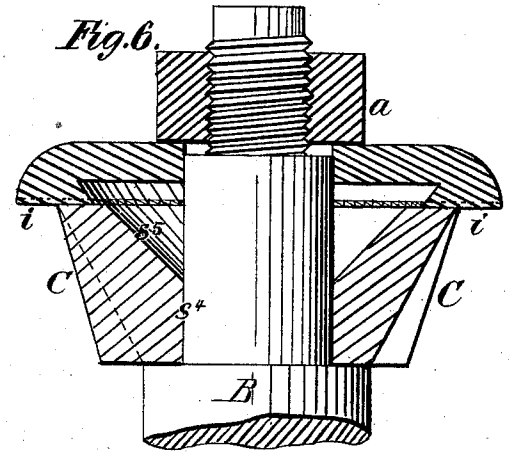


Fig. 6.



Witnesses.

R. T. Campbell

J. H. Rutherford

Inventor.

Edsell Totman

by his Attys

Mason Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

EDSELL TOTMAN, OF BATAVIA, ILLINOIS.

IMPROVEMENT IN GRINDING-MILLS.

Specification forming part of Letters Patent No. **150,731**, dated May 12, 1874; application filed August 28, 1873.

To all whom it may concern:

Be it known that I, EDSELL TOTMAN, of Batavia, in the county of Kane and State of Illinois, have invented certain Improvements on Metallic Grinding-Mills; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1, Plate 1, is a section taken horizontally through the grinding-mill. Fig. 2, Plate 1, is a view of the outside grinding-ring. Fig. 3, Plate 1, is a view of the conical or inside ring. Fig. 4, Plate 1, is a side view of the ring. Fig. 5, Plate 2, is a vertical section through the mill. Fig. 6, Plate 2, is a diametrical section through the internal cone made of two detachable pieces.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to improvements on that class of grinding-mills wherein metallic grinding-rings are employed, one of which is stationary, and the other caused to rotate inside of it. My improvements relate to the construction of the rings and their grinding-surfaces, the manner of applying the rotating ring on its shaft, and the manner of feeding the material to be ground between the rings, as will be hereinafter explained.

The following description of my improvements will enable others skilled in the art to understand the same.

In the accompanying drawings, A represents the frame of the mill, on which is supported, in suitable bearings, a horizontal shaft, B, on one end of which is keyed a fly-wheel, C'. The driving-belt drum which I apply on this shaft B I have not shown in the drawings. C represents the inner and rotary grinding-ring, which is conical, and terminated at the base of the cone by an annular flange, *i*, having a grinding-surface which is obliquely serrated, as shown in Fig. 3. This flanged grinding-surface is in a plane at right angles to the axial plane of shaft B. In Fig. 1 the serrated flange is represented cast on the cone C; but, if desired, the flange may be cast separate, as shown in Fig. 6, and secured by a nut, *a*, on shaft B. The tapered or conical grinding surface or dress of the ring C is made up of oblique grinding and shearing ribs or teeth *r*, which taper from the smallest end of the cone outward to the flange *i*, and which are equidistant apart around the cone. I also form smaller shearing and grinding teeth *r'* between the teeth *r*, which smaller teeth taper from the largest end of the cone and vanish before reaching its smallest end. I thus have teeth extending the entire length of the conical surface, intermediate teeth extending half its length, and still shorter teeth extending about one-quarter its length, as shown in Figs. 3 and 4, Plate 1. The conical ring C, constructed internally with a partly-cylindrical and partly-conical bore, as indicated by the letters s^4 s^5, and applied on its shaft B against a fixed collar, *d*, thereon, and confined to its place and centered by a circular convex plate, D, and nut *a*, as shown in Fig. 1. The plate D is made with a tapering circumference and convex inner face, as indicated by the letters t^4 t^5. By constructing the ring C as shown it is made light and heavy at the proper points for doing the light and heavy grinding. Along that portion where the bore through it is cylindrical the heaviest grinding has to be performed by it, and hence the greater thickness and weight of the metal are thrown at that point. Along the portion where the bore is flaring very light grinding has to be performed, and therefore the thickness and weight of metal are reduced. This construction of the interior of the ring C, in connection with the taper form of the collar D, enables the operator to center the ring truly upon the shaft, and confine it in that condition by means of a nut; and, at the same time, the collar and nut are completely covered all around by the ring, and thus are out of the way of the ground substances which fall from between the grinding-faces. Outside of the ring C is a ring, J, which is rigidly secured to one side of the frame A by means of bolts and nuts *j*, which pass through lugs formed on ring J. This stationary ring is conical interiorly and cylindrical exteriorly. This ring is made with a gradually-increasing thickness, and the thicker part is at the point where the heaviest grinding is to be done, as indicated by the letter s^6, said part being directly around the thicker part of the ring C, as shown. The dress s s^2 of this ring J corresponds substantially with the dress of the cone-ring C, as shown

in Fig. 2, but the cutting-edges oppose those of the ring C. The outer edge s^1 of the ring J is serrated obliquely, the serrations being directly the reverse of the serrations on the flange *i*, so that they operate with a drawing and grinding action on the material as it passes between these surfaces to be delivered into the shell or case G. The shell G, with a plate, L, is rigidly secured to the frame A by bolts and nuts *m*, and through the outer end of this case a circular hole is made, through which passes concentrically the reduced screw-threaded end of shaft B, the extremity of which latter has a concave seat formed into it to receive a center-point bearing, *b*. This bearing is on a bridge-tree, E, which is pivoted, at F, to a lug, *f*, on the case G, and connected at its opposite end to this case by means of a screw-threaded stud, *e*, and a nut, *c*. By turning the nut *c* shaft B, with its cone-ring, is moved endwise, and the grinding-surfaces can be adjusted nearer to or farther from each other, as it may be required to grind finer or coarser.

This mill is fed through a vertical passage, *q*, which conducts the material into a space, *t*, which is a continuous circular channel between the receiving ends of the rings and the plate L of the frame. By means of this channel grain can be fed to the rings all around at the same moment, and it is not necessary to have the feed-passage overhang a part of the grinding-surface in order to feed the grain between the rings. As the grain is fed in it passes around in the channel *t*, and from thence between the conical grinding-surfaces of the rings, and is gradually reduced thereby. From these surfaces it passes between the vertical finishing-surfaces $i\,s^1$, from which the meal escapes finally and falls into the case G, and discharged therefrom through a hole, *l*, shown in Fig. 5, Plate 2, of the drawings.

If the flange *i* is made separate from the cone C, it can be readily detached when worn out and another flange substituted in its place.

The advantage I obtain by feeding my mill as described, instead of through its center, I am enabled to make the rings comparatively shorter and smaller than in other mills, and consequently less power is required to drive them. The rings are also more easily cast than other rings on account of their form, and are not liable to spring out of shape or crack (in the casting or while being used) at the points where the greater strain comes, on account of the metal being disposed in accordance with the work to be done.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The conical rings C J, constructed with a gradual-increasing thickness inward, dressed with teeth $r\,r'\,s\,s^2$, and provided with serrated flanges $i\,s^1$, in combination with the convex tapering disk or collar D, nut *a*, shaft B, annular chamber *l*, shell G, and plate L, the several parts being arranged to operate substantially in the manner shown and described, and for the purpose set forth.

EDSELL TOTMAN.

Witnesses:
BRADLEY BURR,
WALLACE CRAWFORD,
L. M. WHITNEY.