2 Sheets—Sheet 1.

J. RUSSELL.

Grinding Mill.

No. 24,058. Patented May 17, 1859.

Fig. 1

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2 Sheets—Sheet 2.

J. RUSSELL.

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Fig. 8

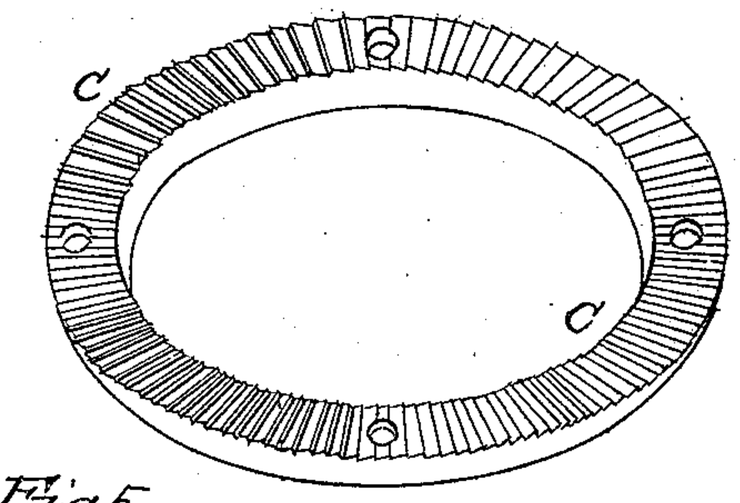


Fig. 7

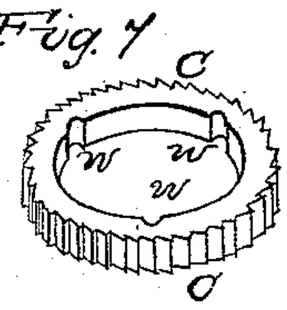


Fig. 9

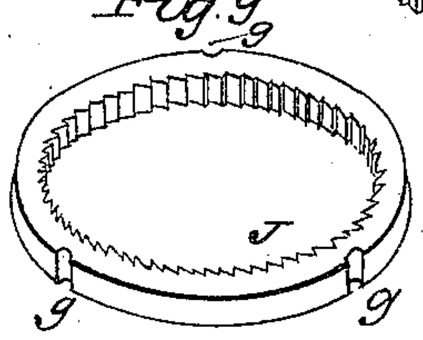


Fig. 5

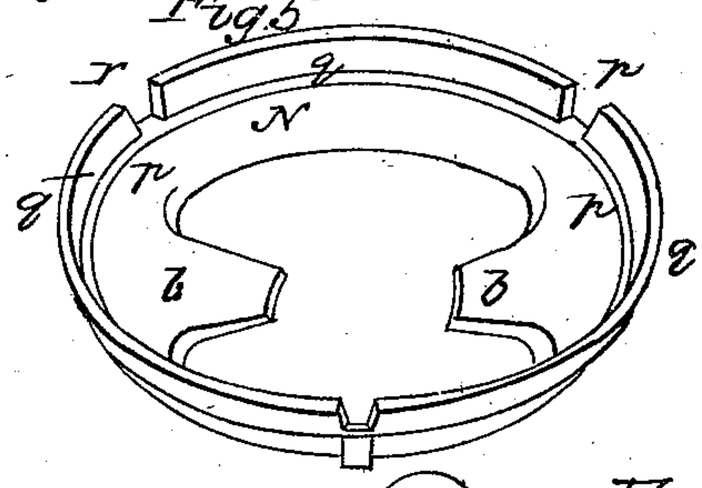


Fig. 6

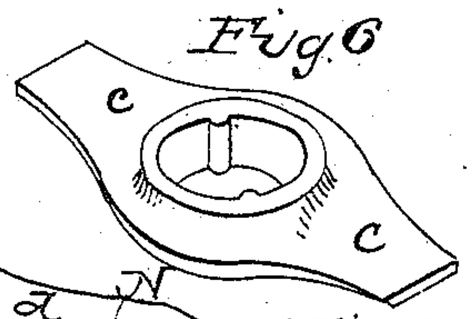


Fig. 4

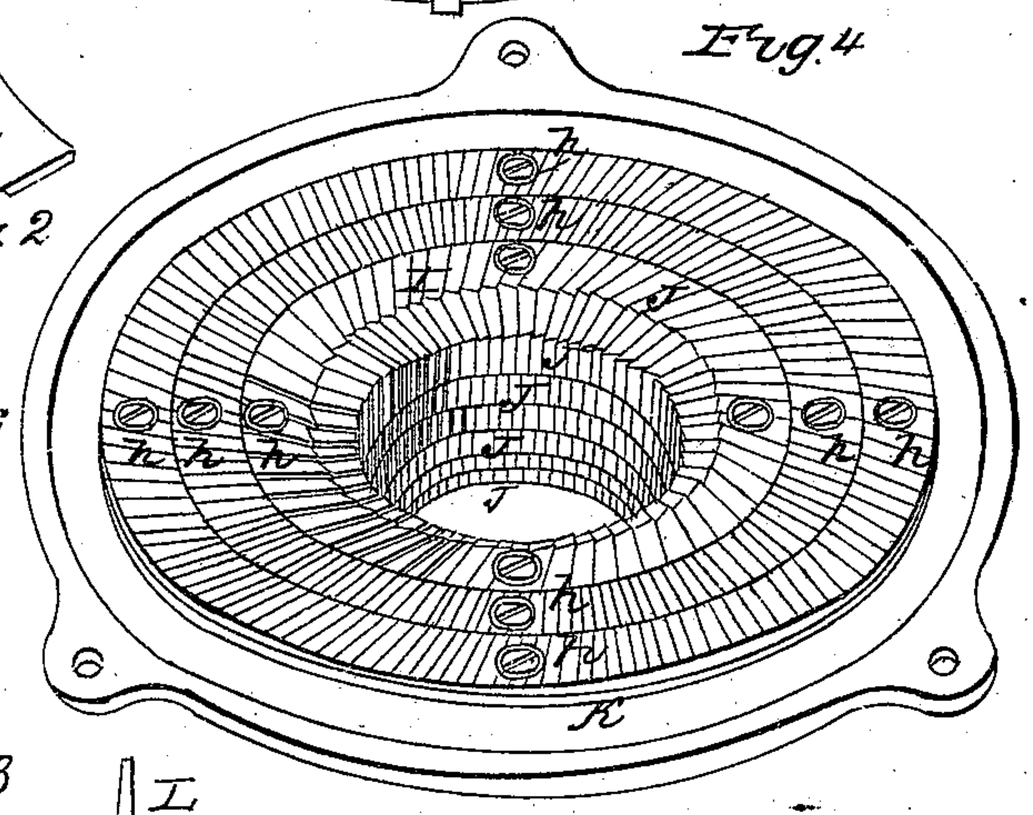


Fig. 2

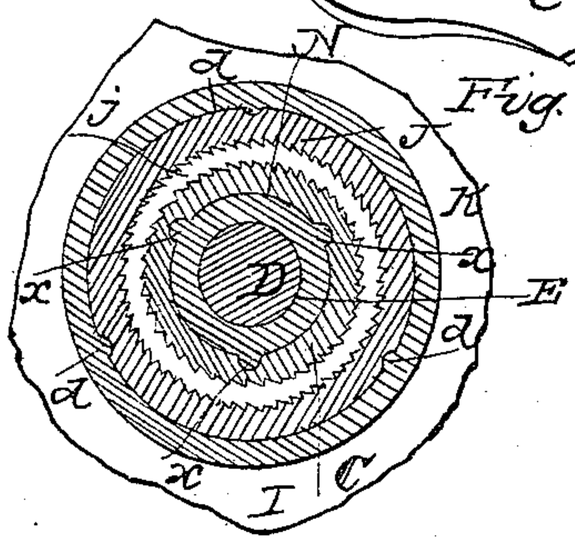
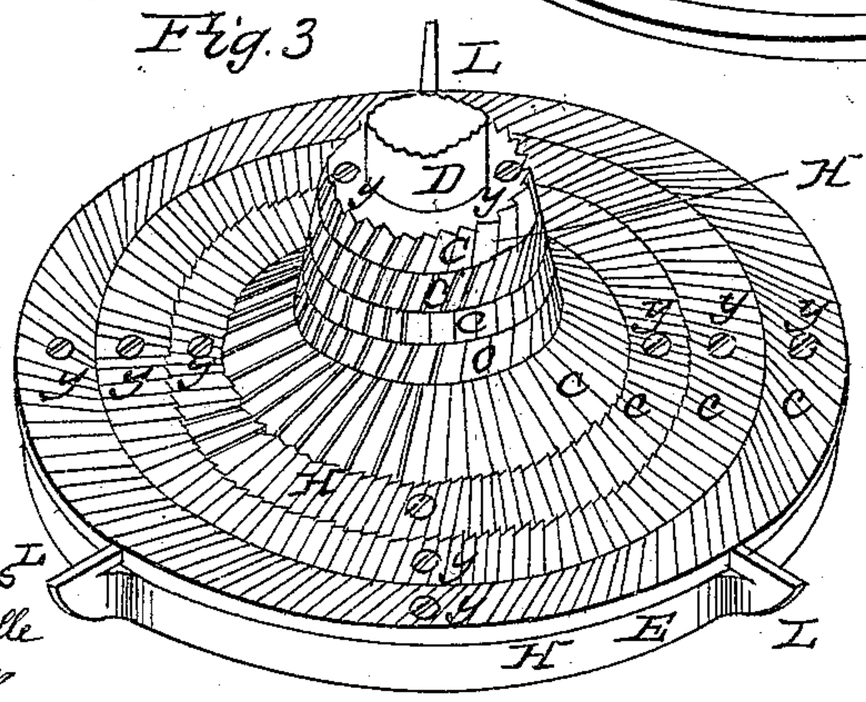


Fig. 3



Witnesses
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Austin F. Park

Inventor
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UNITED STATES PATENT OFFICE.

JOHN RUSSELL, OF TROY, NEW YORK.

CAST-IRON GRINDING-MILL.

Specification of Letters Patent No. 24,058, dated May 17, 1859.

To all whom it may concern:

Be it known that I, JOHN RUSSELL, of the city of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Cast-Iron Grinding-Mills; and I do hereby declare that the following is a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical central section of one of my improved grinding mills; Fig. 2, a horizontal section at the line *z z'*; Fig. 3, an isometrical projection of the toothed "runner" or male part of the mill; Fig. 4, an isometrical projection, showing the inside of the toothed "shell" which covers the runner; and Figs. 5, 6, 7, 8 and 9 are details in isometrical projection.

The same letters refer to like parts in all the figures.

A is the hopper, armed with internal projections, *b*, between which run the arms or wings, *c*, of the breaker, B, fast on the upright spindle, D, which latter revolves upon an adjustable step, *e*, and in a bearing at *f*, in the frame, G, of the mill.

H is the toothed runner, fast on the spindle D, below the breaker, B; and I is the toothed shell which covers the male part or runner, and is arranged below and supports the hopper, and is fastened to the frame G.

The substance to be ground is put into the hopper, A, where, if it is in large pieces, like ears of Indian corn, it is broken by and between the revolving wings, *c*, and the arms, *b*, and then falls into the space, *i*, between the runner and shell, where it is first cracked and then ground fine, and then discharged into the annular trough, *k*, within which latter it is carried by followers, L, to a spout, M, through which the ground material falls from the mill. I do not limit myself to revolving the toothed male part, H, and breaker, B, and leaving the shell, I, and hopper A, stationary; but shall run the shell and armed hopper, and leave the breaker and male part stationary, or shall run the male part and breaker in one direction, and the shell and hopper in the opposite one, or in the same direction, with a different speed, whenever circumstances shall render it desirable to do so, for it is obvious that the construction and action of the mill will be substantially the same in all those cases.

Instead of casting the hopper, A, and all its internal arms or projections, *b*, in one piece, I construct the armed portion of the hopper of separate rings, N, each provided with a set of projections, *b*, and all arranged in a series, one upon another, and held together in the mill by screw bolts, O, or other suitable means, each ring, N, see Fig. 5, being formed with a shoulder, *p*, flange, *q*, notches, *r*, and lugs, *s*, or equivalent devices, for preventing the rings from being displaced sideways. I thus make the internally-armed portion of the hopper of separate rings, N, for the purpose of casting the projections, *b*, more easily and perfectly; and also in order that any of the annular sets of arms, *b*, may at any time be removed and replaced by others when one of them becomes broken, or when it is necessary or desirable to employ others of a different shape, as is often the case when the mill is used for breaking up and grinding substances of various structure; such as bones, dye woods, oyster shells, dried vegetables, corn on the cob, dried roots, herbs, and barks.

Instead of having the toothed face of the male part, H, of a single casting united to the spindle D through the intervention of a face-plate, as shown in No. 18,178 of United States Patents; and instead of having it consist of a series of circular saws fastened side by side upon the spindle; and also in contradistinction from having the runner consist of a series of segments or sectors, reaching from the inner to the outer edge of the grinding or toothed surface thereof, and secured upon a face-plate fast on the spindle, I construct the under grinder, H, of separate toothed rings, C, (see Figs. 7 and 8,) all arranged concentrically together upon, supported in place by, and secured to the face-plate or casting, E, which has substantially the form of the toothed face of the runner and is fast on the spindle D; the rings, C, being secured to the face-plate or casting E by means of grooves, *w*, in the rings, and tongues, *x*, on the hub of the plate, and screws, *y*, as shown, or by equivalent means. I thus make the under grinder, H, of separate toothed rings, C, secured to the plate, E, in order that better teeth may be cast, and more easily, than if it was all in one piece or in radial sections; also in order that when any annular portion of the grinder H gets dull before the other parts, the worn portion may be removed and easily

sharpened by filing, and then replaced, or a new ring or rings substituted, the undulled portions of the toothed surface being continued in use; also in order that substances may be cracked and coarsely ground by the mill at a fast rate, and at the same time without at all dulling the finely cut grinding portions of the mill, by simply removing the outer or largest of the rings, C, and then using the mill; also, in order that the mill may be adapted to crack and grind substances of very different structure by changing one or more of the rings C for others of a different dress.

Instead of making the upper grinder, or shell, I, of a single casting; or of a series of toothed segments, each reaching radially from the inner edge to the outer one of that grinder, and secured upon the interior face of a supporting plate; and also, instead of making the shell of two or more annular pieces, each separately secured to the frame of the mill without any exterior covering common to both, as shown in No. 14,002 of United States Patents, I construct the shell, I, of separate toothed rings, J, Fig. 9, arranged concentrically together upon, supported in place by, and secured to the under or inner face of the hollow plate K, by tongues, *d*, grooves, *g*, and screws, *h*, or by equivalent devices.

I make the upper grinder, I, of separate toothed rings, J, constructed, arranged and secured to the plate K as above described, in order that, without changing the structure of the under grinder, H, the mill can be fitted for cracking and grinding substances of widely different character by changing one or more of the rings J for others having different teeth; and so that by removing one or more of the outer or largest of the toothed rings, J, the mill will be fitted for coarse grinding or cracking, without dulling or wearing the finely-cut grinding portion of the mill; also in order that the shell may be provided with better teeth, and such as it would be difficult or impossible to cast if the shell was not made of rings; and so that when annular portions of the cracking or grinding teeth of the shell get dull, the worn parts may be removed and replaced by new ones, or the worn rings may be easily sharpened and put back, the undulled rings being continued in use. Instead of having each of the rings, C, J, consist of a single piece or casting, I cast those rings each in two or more parts or sections, whenever it is desirable. And I make the hopper and the grinders, each of more or less rings than the numbers shown in the drawings, as circumstances render desirable.

Having thus described the construction and advantages of my invention, what I claim as new and desire to secure by Letters Patent is—

1. The combination of the breaker, B, and internally armed hopper, A, with the upper grinder, I, and lower grinder, H, all arranged and operating together, as herein set forth, for the purpose of feeding into the mill and grinding large substances, such as corn on the cob.

2. And I also claim making the armed portion of the hopper of separate rings, N, provided with internal projections, *b*, and arranged and secured together in the mill, as and for the purpose herein set forth.

3. And I also claim making the lower grinder, of separate toothed rings, C, arranged and secured together upon the supporting-plate, E, as and for the purpose herein described.

4. And I also claim making the upper grinder, of separate toothed rings, J, arranged and secured together in and to the supporting-plate, K, as and for the purpose herein set forth.

JOHN RUSSELL.

Witnesses:
GEO. MACARDLE,
AUSTIN F. PARK.