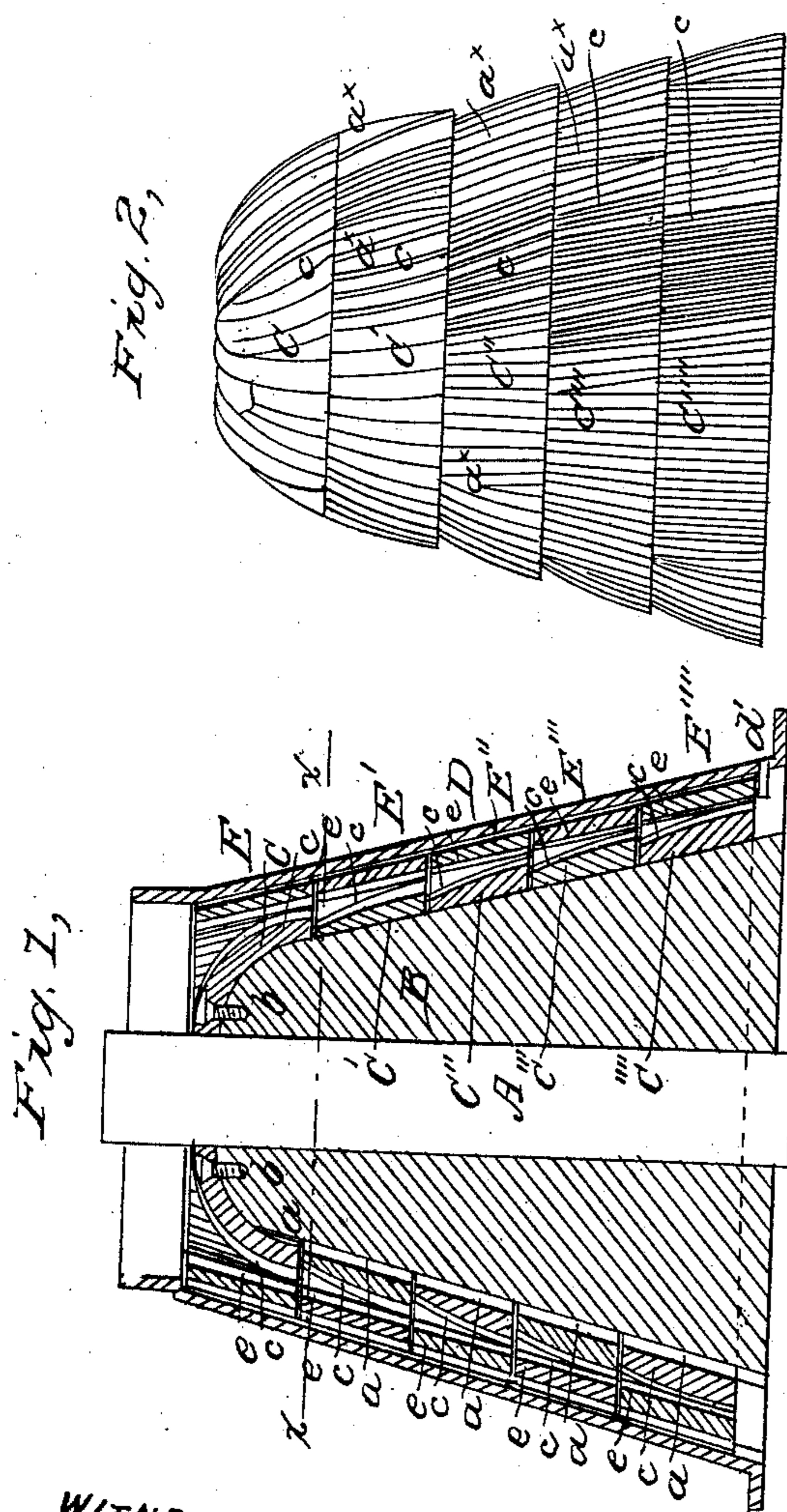


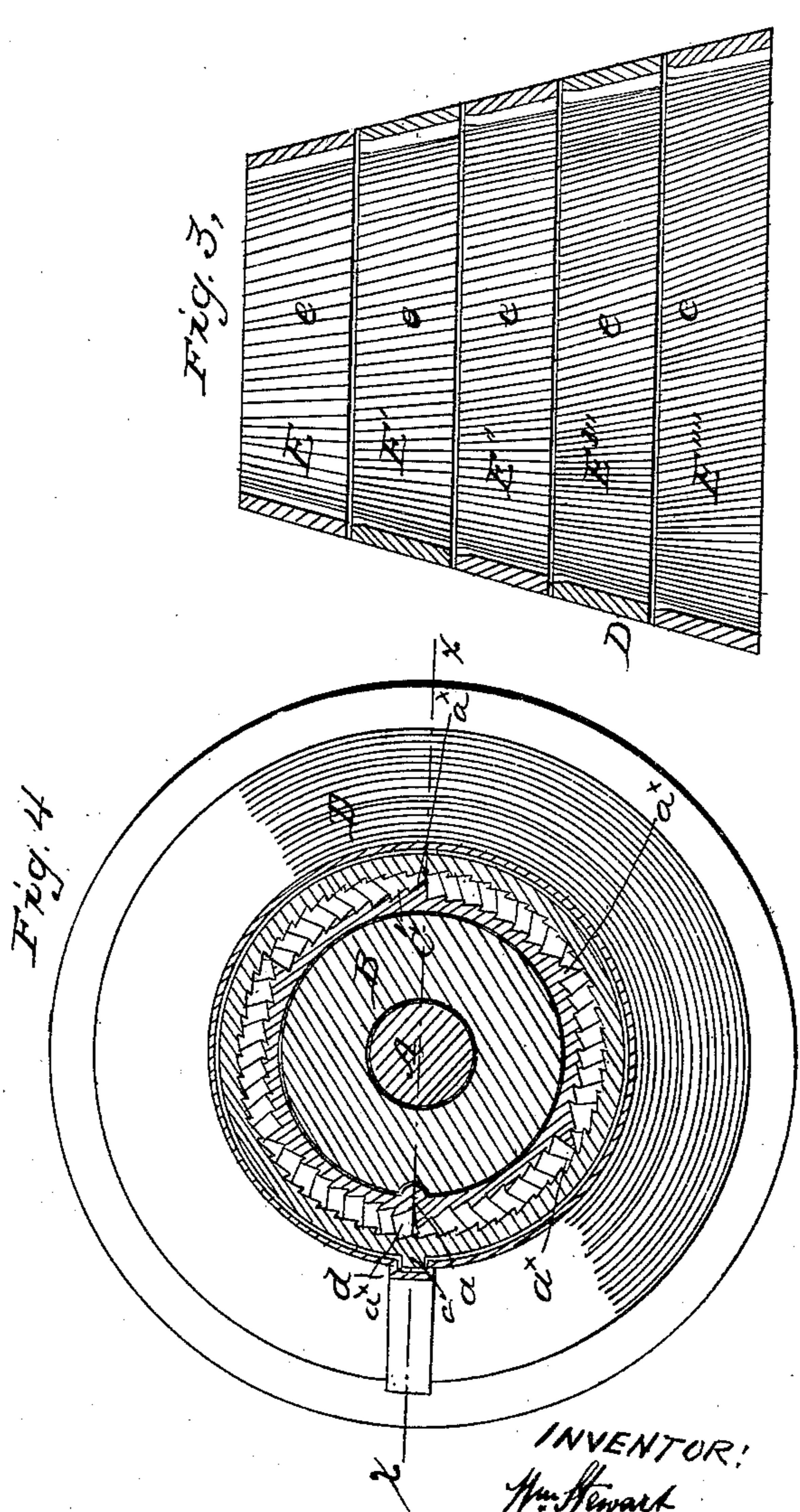
W. STEWART.
Grinding Mill.

No. 31,492.

Patented Feb. 19, 1861.



WITNESSES:
Hoboken
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INVENTOR:
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UNITED STATES PATENT OFFICE.

WILLIAM STEWART, OF PHILADELPHIA, PENNSYLVANIA.

MILL.

Specification of Letters Patent No. 31,492, dated February 19, 1861.

To all whom it may concern:

Be it known that I, WILLIAM STEWART, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Grinding-Mills; and I do hereby declare that the following is a full, clear, 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 my invention taken in the line x, x , Fig. 4. Fig. 2 is a detached external view of the conical grinder. Fig. 3 is a detached vertical central section of the shell. Fig. 4 is a horizontal section of Fig. 1, taken in the line x', x' , Fig. 1.

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

The invention relates to an improvement in that class of grinding mills in which a cast-metal conical grinder is placed within a shell of corresponding form. The chief difficulty attending the operation of this kind of mill has been the producing of uneven work that is to say, portions of the article being ground, are discharged much coarser than others, and the mill while working rapidly produces inferior work. In order to obviate this difficulty diagonal teeth or projections have been used in connection with the ordinary corrugations or grinding surfaces, said teeth or projections being designed to arrest the progress of the article being ground through the mill, and thereby insure its reduction to a proper fine state before its discharge. This arrangement has not been generally adopted as it creates as great a difficulty as the one it was designed to obviate, to wit, the choking or clogging of the mill. This class of mills also have been hitherto liable to heat and soon become worn and unfit for use.

My invention consists in a peculiar construction whereby the above named difficulties are avoided, while the advantages of this class of mills, to wit, rapidity of grinding in connection with economy of construction, are retained.

To enable those skilled in the art to fully understand and construct my invention I will proceed to describe it.

A represents a vertical shaft on which a frustum of a cone B, is secured, and C, C', C'', C''', C''', are rings or bands which are placed on B, one over the other, each ring

or band being the frustum of a cone, and the upper end of each a little smaller in diameter than the base of the one immediately above it, as shown clearly in Figs. 1 and 2. The rings or bands C, are of cast metal, while the conical body B, on which they are placed is of wood. The rings or bands C, may be secured to their body B, in any proper way so as to prevent them slipping or turning thereon and the whole number of rings when adjusted on their body B, may be described as being a frustum of a cone with an unequal surface caused by the difference in the diameters of the adjoining surfaces of the rings or bands. By referring to Fig. 4 it will be seen that the body B, on which the rings or bands C, are placed is grooved longitudinally, and a projection a , on the inner side of each ring or band is fitted in this groove. This arrangement effectually prevents the turning of the rings or bands on the body B. The top ring or band C, is also secured to the body B, by screws b, b . The rings or bands C, are provided at their periphery with teeth or corrugations c , which are inclined from a vertical line in a greater or less degree according to the "draft" required, and the teeth of the rings or bands gradually decrease in size from the upper to the lowermost ring or band, as shown clearly in Fig. 2.

D represents a conical shell which is of cast metal of suitable thickness and has a series of cast metal rings or bands E, E', E'', E''', E''', secured within it. These rings or bands are of conical form, and when secured one over the other in the shell D, form the frustum of a hollow cone. The rings or bands E, are each provided with a projection c' , at their outer sides, and these projections fit in a groove d , in the shell D,—see Fig. 4. This arrangement effectually prevents the rings or bands E, from turning within the shell D. The lowermost ring or band E, rests on horizontal pins or projections d' , attached to the shell D. The inner surfaces of the rings or bands E, are provided with teeth or corrugations e , which, like the teeth c , of the rings or bands C, are inclined from a vertical line in a degree equal to the "draft" required. The inner surfaces of the rings or bands E, form a uniform surface throughout; that is to say, the diameter of the adjoining ends of the rings or bands are equal, as will be seen by referring to Figs. 1 and 3.

The rings or bands C, are placed within the rings or bands E, the shell D, of the latter being secured permanently in a vertical position, and the lower edge of each
5 ring or band C, just touches the lower edge of its fellow ring or band E, as shown clearly in Fig. 1, the rings or bands C, gradually receding from their fellows E, from their lower to their upper ends. By this
10 arrangement it will be seen that each ring or band C, with its fellow E, forms a distinct grinding device, and as the shaft A, and rings or bands C, rotate, the article to be ground passes consecutively through a
15 series of grinding devices which are toothed to act in the most efficient way on the article at different stages of the grinding process, and cause the same to be ground in a uniform manner.
20 The superiority of my device over the ordinary conical grinder which is cast in one piece and is brought in contact with the shell only at its base, must be evident, for in this case many portions of the ground article escape in a coarse state. Besides the
25 grinder being also cast in one piece, if it break or crack, an entire new casting is required, and the same may also be said of the shell which is cast in one piece. In my in-

vention any of the rings or bands in case of breaking may be readily replaced by a new one.

I would remark that the rings or bands C, are provided at intervals with teeth or clearers a^* , which extend outward nearly to the
35 teeth of the rings or bands E. These prominent teeth are for the purpose of preventing the choking or clogging of the mill a result which is effected in consequence of the clearers or teeth a^* , stirring the mass in the
40 spaces between the upper parts of the rings or bands.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:—
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The construction of the grinder with a series of conical toothed rings or concaves E, placed one above the other within an exterior conical case D, and a series of conical grinding toothed rings C placed one above
50 the other upon a cone B, the whole arranged and operating in the manner and for the purposes herein shown and described.

WILLIAM STEWART.

Witnesses:

WILLIAM A. PALMER,
JAMES McCABEN.