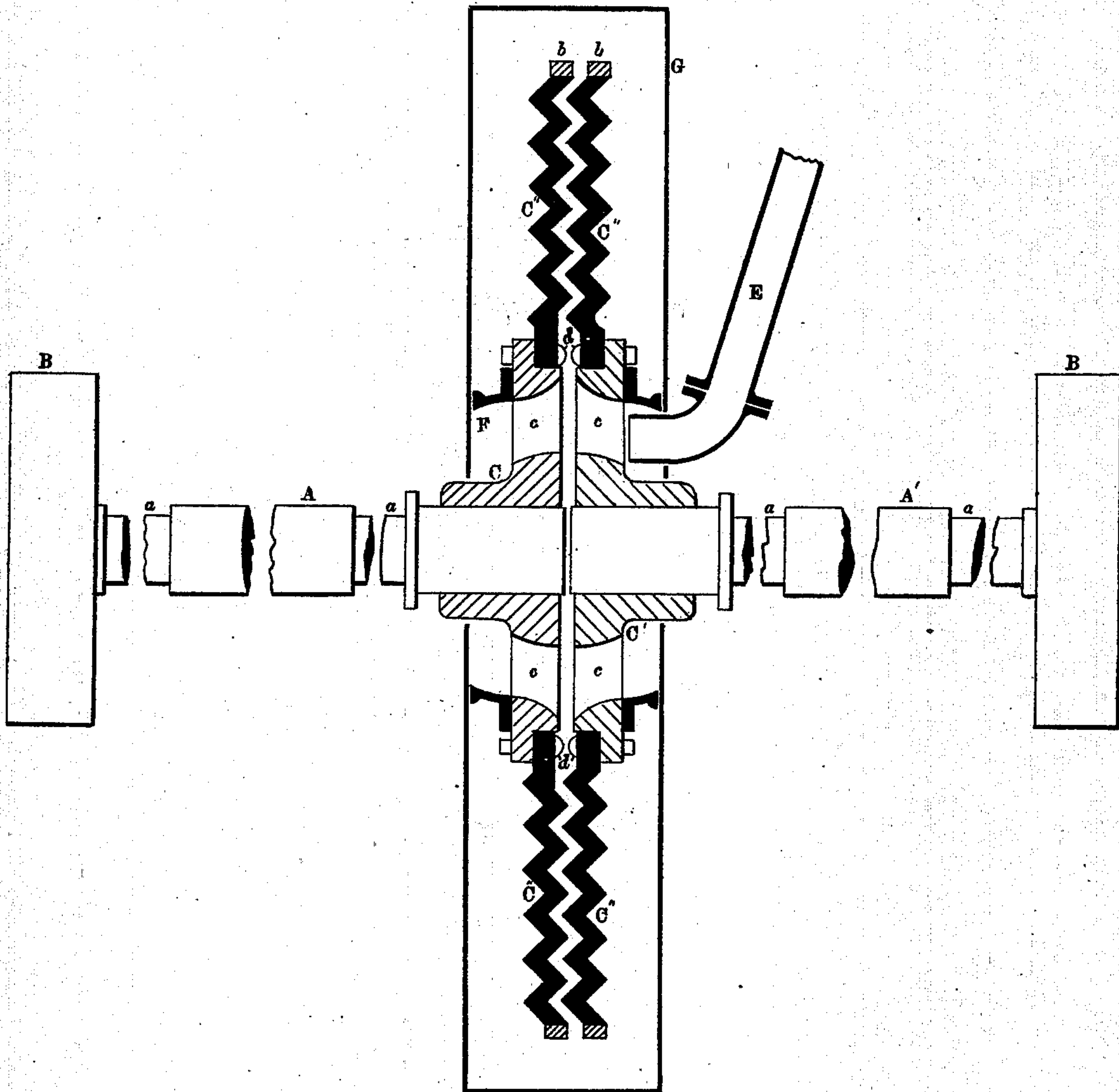


**W. DENMEAD.**  
**Disintegrating Mills.**

No. 146,324.

Patented Jan. 13, 1874.

—FIG. I.—



—WITNESSES—

*H. A. Daniels*  
*W. B. Davis*

—INVENTOR—

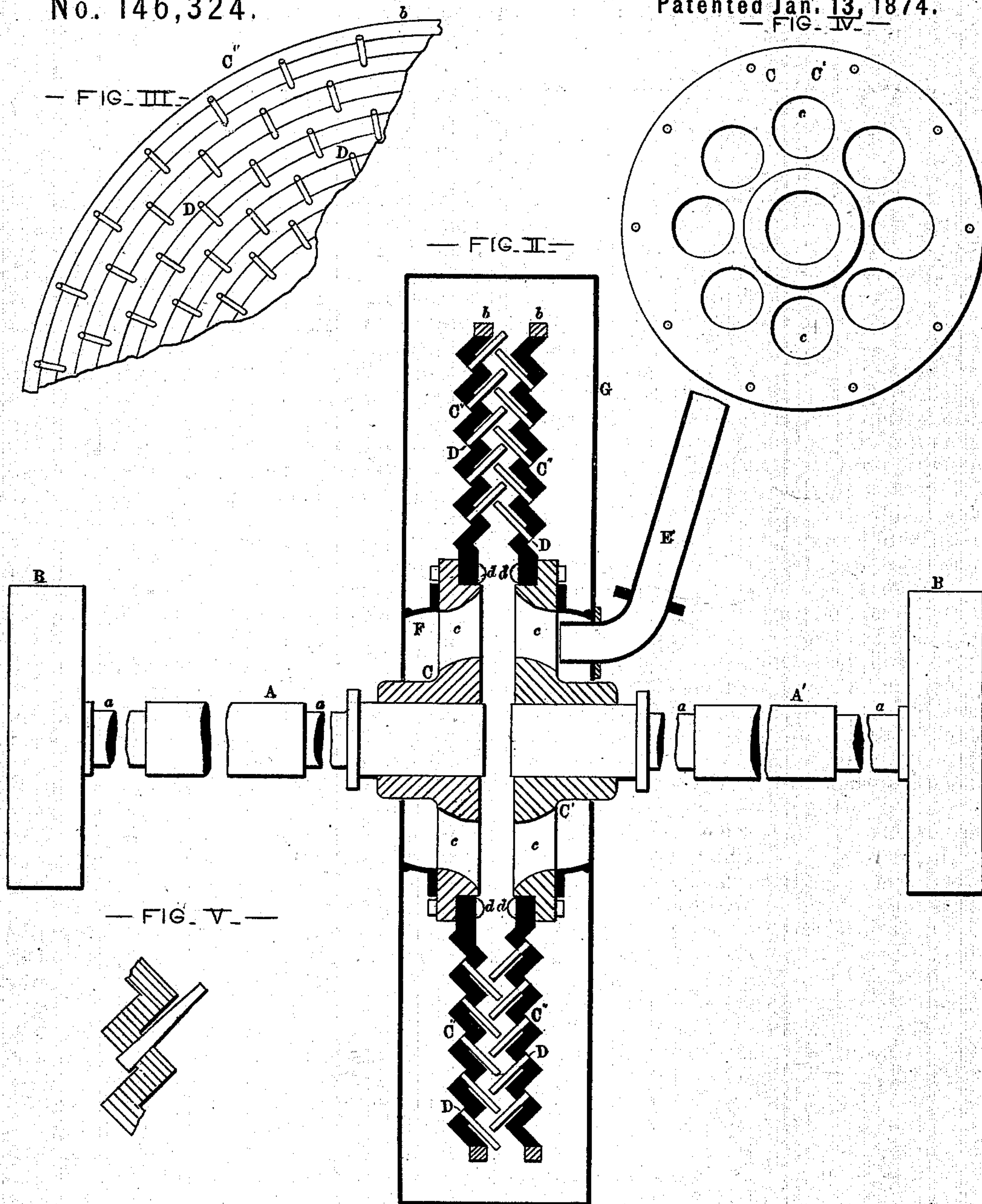
*William Denmead,*  
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*attys.*



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# UNITED STATES PATENT OFFICE.

WILLIAM DENMEAD, OF MELVALE, MARYLAND.

## IMPROVEMENT IN DISINTEGRATING-MILLS.

Specification forming part of Letters Patent No. **146,324**, dated January 13, 1874; application filed November 4, 1873.

*To all whom it may concern:*

Be it known that I, WILLIAM DENMEAD, of Melvale, in the county of Baltimore and State of Maryland, have invented certain Improvements in Disintegrating-Mills, for the grinding of grain, bones, ores, and other material capable of disintegration, of which the following is a specification; and I do hereby declare that in the same is contained a full, clear, and exact description of my said invention, reference being had to the accompanying drawing and to the letters of reference made thereon.

My invention relates to improvements in that class of disintegrating-mills in which the material is disintegrated by being thrown, by centrifugal force, against and past a series of pins or beaters secured to disks revolving in opposite directions; and consists, first, in a new construction and arrangement of the disks, each of which shall have, opposing the other, a surface that shall show, in a diametrical edge section of the disk, a zigzag line, each depression of which shall be confronted, and, to some degree, penetrated, by an elevated portion of the zigzag surface of the adjacent disk. The object of this corrugation of the inner surfaces of the disks is to utilize them as disintegrating elements in the mill, which has not heretofore been done, by giving them operating surfaces, against which the material to be disintegrated, thrown from the center of the disks by centrifugal force, must strike, rebounding from one surface to another. My invention further consists in the combination and arrangement of the disintegrating pins or beaters ordinarily used in this class of mills with, and in reference to, the disks, having inner corrugated surfaces, as described, in such wise as to cause the said pins to stand, as seen in a vertical longitudinal section of the mill, at an angle with the disk-shafts as a horizontal base, each pin of each different annular row extending at a right angle, or forming a T with each opposing pin of the opposite annular row. My invention further consists in a peculiar construction of the disintegrating pins or beaters, and their combination with, and mode of attachment to, the disk. My invention further consists in the combination with the disks, as described, of opposing annular rows of steel bolt-heads—preferably the heads of the bolts which attach

the disks proper to their separate hubs—the object of this disposition of bolt-heads being to cause them to act as immediate breakers or crushers of the material when, by the action of centrifugal force, it is first thrown from the center of the mill between the disks to their peripheries.

In the further description of my invention which follows, due reference must be had to the accompanying drawing, in which—

Figure 1 is a sectional plan view of the mill constructed without disintegrating pins or beaters, the frame being omitted. Fig. 2 shows a similar view of the mill with the addition of the disintegrating pins or beaters. Fig. 3 is a face view of a portion of a disk and its pins. Fig. 4 is a front or face view of a disk-hub. Fig. 5 shows the method of securing the pins to the disk.

Similar letters of reference indicate similar parts of the invention in all the views.

A A' are the disk-shafts, each being provided with a pulley, B, and arranged in a suitable frame at the bearings *a*, so as to be capable of being revolved in opposite directions. The hubs C C' of the disks are securely keyed to the shafts, and the disks proper, C'', bolted strongly to the hubs. The disks may be made of cast-steel or iron, and surrounded by wrought bands *b*, in view of the inherent strength necessary in the disks to withstand the violent radial strain to which they are subjected when running at a high rate of speed. The inner faces of the opposing disks show, in Figs. 1 and 2, the zigzag outline hereinbefore described, the raised portion of one disk confronting, and, in Fig. 1, partly entering, the depressed portion of the other. The steel pins or beaters, which are represented by D, are arranged in concentric annular rows, and secured to the surfaces of the disks, their ends projecting beyond the limit of the most elevated portions thereof. The pins are made slightly tapering, and driven into the disks from the outer faces, which, as an expedient for lightening the castings, have surfaces similar to the inner. This method of securing the pins, in view of the angle at which they are placed, tends effectually to prevent their loosening, as the effect of the radial strain to which the disks are subjected, and which strain is transmitted, in some



degree, to the pins, is to seat them more firmly in the disks. E is a feed-pipe, (shown, for convenience, in Figs. 1 and 2, turned over from a perpendicular line,) leading to the casting F, which fits between the hub C and the casing G.

The grain or material to be disintegrated enters the center of the machine, from the pipe E, through the opening *c* in the hub, and is immediately thrown, by centrifugal force, through and past the disintegrating parts of the mill, consisting, as shown in Fig. 2, of the steel bolt-heads *d*, inner corrugated or zigzag surfaces of the disk, and pins or beaters D; or, as seen in Fig. 1, the same elements, excepting the pins D, to the casing G, and falls, of its own gravity, to the lowest point thereof, whence it is conveyed from the mill by suitable means.

The principal merits of this machine are to be found in the adapting of the disks themselves to be utilized as elements in the active disintegration of the material; and when the pins are used in doubling the disintegrating capacity of the machine without increasing the number or weight of parts above those in other mills of its class; as, also, in securing the pins in such a manner to the disks that the strain and motion, which usually loosen them in their sockets, tend to seat them more firmly.

Having thus described my invention, what I claim as new, and wish to secure by Letters Patent of the United States, is—

1. The construction and relative arrangement of the disks C'', mounted upon oppositely-revolving shafts, the disks having the zigzag or corrugated inner surfaces opposing, and partly penetrating, each other, substantially as set forth.

2. A combination of two opposing disks, mounted upon shafts revolving in opposite directions, the said disks having corrugated inner surfaces opposing each other, provided with inclined interposing disintegrating-pins, in concentric annular rows at a right angle with the portion of the said surface forming their seats, and parallel with the other part of that surface, substantially as set forth.

3. The opposing annular rows of steel bolt-heads *d*, in combination with disks upon shafts revolving in opposite directions, as set forth.

4. The combination, with the disk or disks, of a tapering disintegrating-pin, or series of the same, in annular concentric rows, driven from the exterior of the said disk or disks at an angle with the horizontal shafts of the machine, substantially as specified.

WM. DENMEAD.

Witnesses:

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T. J. LOVEGROVE.