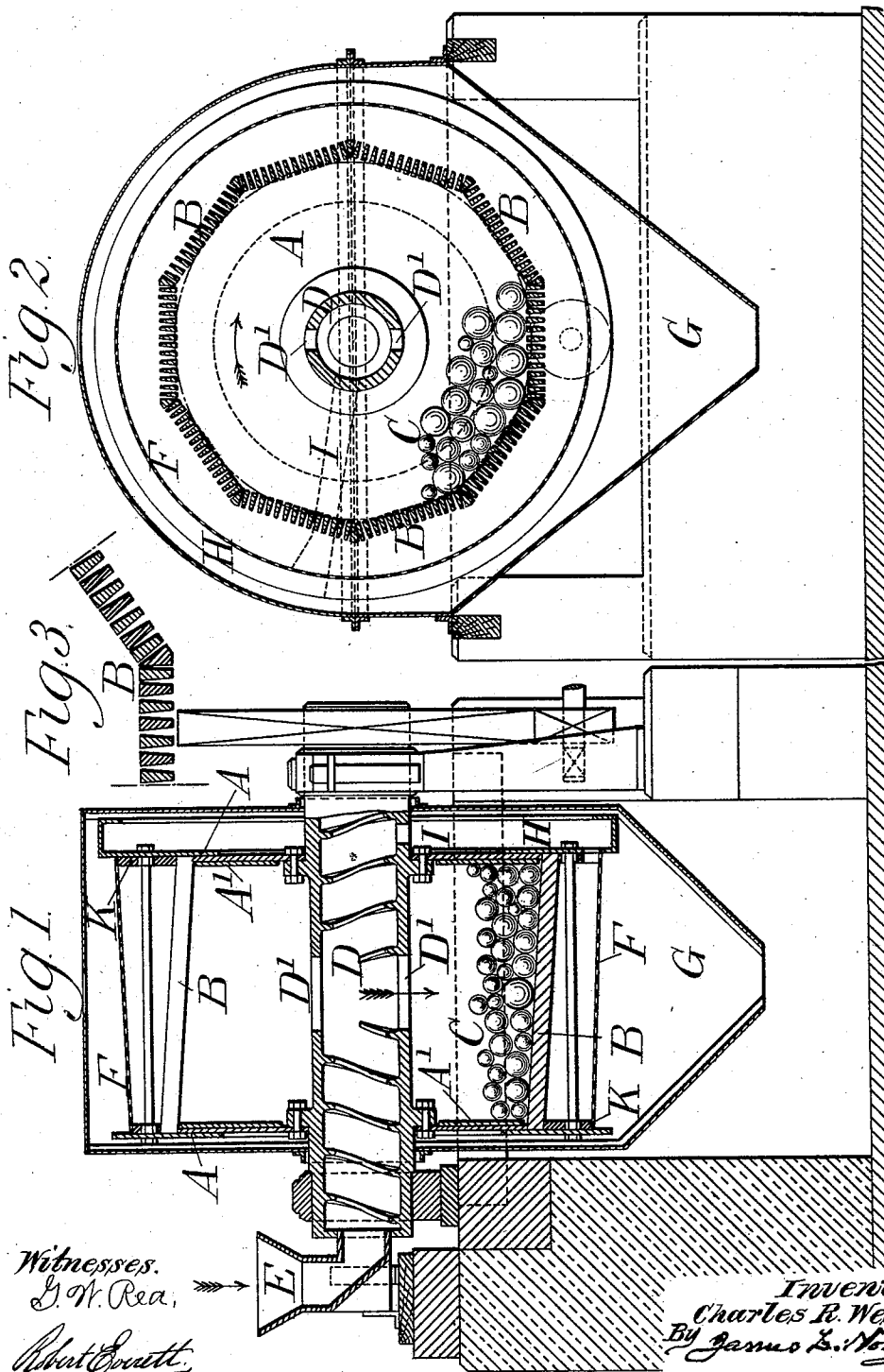


(No Model.)

C. R. WESTERN.
PULVERIZING MILL.

No. 536,112.

Patented Mar. 19, 1895.



UNITED STATES PATENT OFFICE.

CHARLES R. WESTERN, OF LONDON, ENGLAND.

PULVERIZING-MILL.

SPECIFICATION forming part of Letters Patent No. 536,112, dated March 19, 1895.

Application filed October 15, 1894. Serial No. 525,986. (No model.) Patented in England September 6, 1893, No. 16,771.

To all whom it may concern:

Be it known that I, CHARLES ROBERT WESTERN, a citizen of England, residing at Broadway Chambers, Westminster, in the city of London, England, have invented certain new and useful Improvements in Pulverizing-Mills, (for which I have obtained a patent in Great Britain, No. 16,771, bearing date September 6, 1893,) of which the following is a specification.

My invention relates to a mill for crushing, pulverizing, grinding or reducing materials, in which mill a revolving cylindrical or other shaped circumferentially perforated drum, contains a number of hard balls or lumps which, in revolving in contact with the material to be operated upon, pulverize or grind it so that the finer particles pass through the perforations to external sieves and the particles that do not pass through these sieves are conducted back into the drum to be operated on again.

My present invention has mainly for its object to provide a convenient and effective screening surface for the crushed material to pass through. For this purpose, I construct the periphery of the drum as I shall describe referring to the accompanying drawings.

Figure 1 shows a longitudinal section and Fig. 2 a transverse section of a ball mill constructed according to my invention. Fig. 3 is a part cross section of the drum, showing, to an enlarged scale, the form of the bars employed.

The drum is composed of two side cheeks A A between which is the screening surface B built up of bars of a tapering section, as shown at Fig. 3; and so arranged as to leave narrow interstices between their inner edges. These bars are by preference secured in an inclined position relatively to the axis of the drum, or in other words, the drum formed by them constitutes a screen having, in cross-section, the form of a symmetrical polygon, which screen revolves with the shaft on which it is mounted, but has its axis inclined to the axis of said shaft, so that, in revolving, the lower part of the periphery alternately inclines in opposite directions, causing the crushing balls C to shift alternately from the one side of the drum to the other.

The shaft D of the drum is tubular, and

communicates at one end with a hopper E through which the material to be crushed is introduced, and it has openings D' at the middle for the entrance of material into the drum. For insuring a regular feed of the materials to these openings, I prefer to form a helical rib on the inner surface of the axis as shown. Surrounding the screening surface B is a circular fine screen F on which the materials passing through B fall and through which the finely crushed particles pass into the chute of the casing G. The screen F is made slightly conical so that the coarser materials retained by it are caused to pass to the right hand side of the drum, in the side cheek A of which are formed openings through which the material passes into a circular chamber H, fixed to the side of the drum and from which a radial passage I conveys the material back into the hollow shaft D. The radial passage I consists of two partitions extending radially through the chamber H, and adapted to conduct the crushed material which finds its way into said chamber from the space between the screens B and F, to an opening in the hollow axle, or shaft, shown in Fig. 1. The material passes in this manner into the hollow shaft, which latter having a reversed helical rib delivers the material back into the drum to be acted on again.

The bars constituting the screening surface B may be conveniently secured in position by forming the central portion of the cheeks A of eccentric disks A' having a polygonal periphery for the inner edges of the bars to rest upon, and then securing the bars in that position by segmental plates K bearing against the outer edges of the bars and fixed to the external annular parts of the side cheeks A.

Having thus described the nature of my invention and the best means I know for carrying it out in practice, I claim—

1. A ball-mill having a horizontal hollow axle or shaft, a drum mounted on said shaft and composed of bars having suitable interstices between, and arranged to form in cross-section a symmetrical polygonal screen which revolves with the shaft, but has its axis inclined to that of the shaft whereby balls placed in said screen will be caused to shift toward each end, alternately, as the screen revolves, a hopper communicating with one end of the

hollow axle or shaft, which is provided with interior helical ribs inclined from each end toward openings formed in said axle to permit the material to pass into the polygonal screen, and a concentric, circular screen surrounding said polygonal screen, the drum being provided at one end with a radial passage which communicates with the space between the circular and the polygonal screens and with the end of the hollow axle opposite the hopper, substantially as described.

2. A ball-mill comprising a horizontal, hollow axle, or shaft having openings between its ends and interior helical ribs which are inclined from the opposite ends of the axle toward said openings, a drum mounted on said hollow shaft and consisting of bars having narrow interstices between and arranged to form, in cross-section, a symmetrical, polygonal screen which revolves with but has its axis inclined to, the shaft, whereby balls placed in said screen will have a movement toward each end, alternately, as the shaft turns,

a hopper communicating with one end of the hollow axle, or shaft, and a circular, concentric screen surrounding the polygonal screen, the diameter of the circular screen being greatest at the end of the shaft farthest from the hopper, the corresponding end of the drum being provided with a chamber communicating with the space between the circular and the polygonal screens, and a radial passage leading to an opening in the end of the hollow axle, or shaft, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 4th day of October, A. D. 1894.

CHARLES R. WESTERN.

Witnesses:

G. H. HADDEN,

JNO. P. M. MILLARD,

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