No. 833,664. PATENTED OCT. 16, 1906.

R. BENEKE.

BALL MILL.

APPLICATION FILED NOV. 4, 1905.

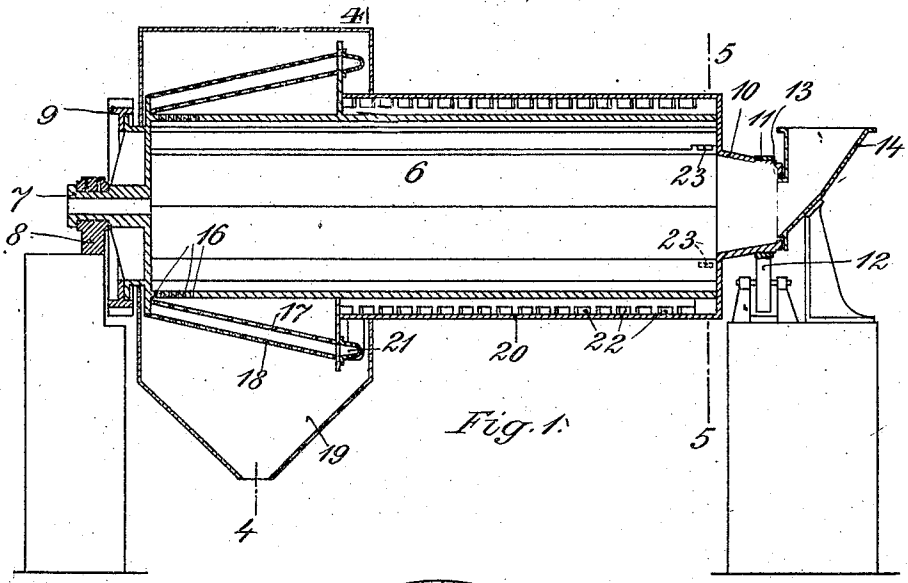

Fig. 1.

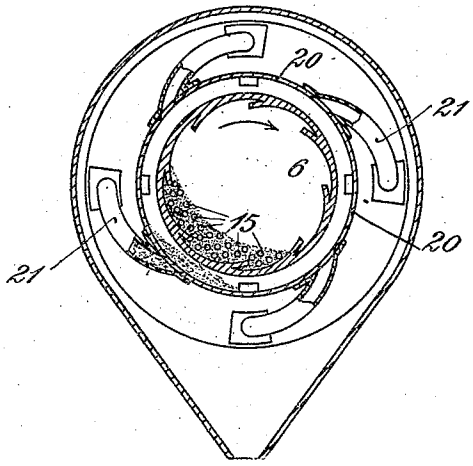

Fig. 2.

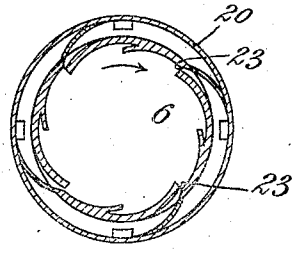

Fig. 3.

WITNESSES

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RICHARD BENEKE, OF BROMBERG, GERMANY.

BALL-MILL.

No. 833,664. Specification of Letters Patent. Patented Oct. 16, 1906.

Application filed November 4, 1905. Serial No. 285,907.

To all whom it may concern:

Be it known that I, RICHARD BENEKE, merchant, a subject of the King of Prussia, German Emperor, residing at No. 6 Mittelstrasse, Bromberg, German Empire, have invented new and useful Improvements in Ball-Mills, of which the following is a specification.

My invention relates to improvements in ball grinding-mills provided with screens in which the partially-reduced material, still too coarse to pass through the outer sieve, is conducted back to the grinding-drum for further treatment by the balls.

The power required to drive a ball-mill depends, essentially, upon the total weight of the material to be ground and of the grinding-balls and on the distance of the center of gravity of this charge from the axis of rotation of the mill. The larger the mill is the greater its capacity and the higher, therefore, the power required to overcome the moment of inertia due to the elevated charge and which is still further increased by the coarse material traveling back into the drum for further grinding.

The object of my invention is to limit to a minimum the power necessary to drive long mills in which the length of the sieve portion requisite for screening only incloses a relatively short portion of the entire drum or grinding-cylinder; and I attain my object by making the casing or shell for returning the coarse not yet thoroughly comminuted material to the drum of smaller diameter than the outer screen.

One form of construction of my invention is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal section; Fig. 2, a cross-section on the line 4 4 of Fig 1, and Fig. 3 a like section on the line 5 5 of the same figure.

The mill-drum 6 is furnished at one end with a trunnion 7, mounted in a plumber-block 8 and carrying a toothed rim 9 for driving the drum, while at the other end a conical part 10 is provided, the tread-rim 11 of which runs on rollers 12. The stationary feed-hopper 14 is fitted in front of the aperture 13 of the cone 10. The material to be ground is fed into the drum 6 through the hopper 14 and is ground during rotation of the drum by the balls 15. During reduction the material travels toward the opposite end of the drum, where it falls through apertures 16 onto screens 17 18. The fine material passes through the screen 18 into the delivery-hopper 19, while the coarser tailings are returned to the grinding-drum.

In prior mills the path followed by the partially-reduced material or tailings, still too coarse to pass through the screen 18, is either along the direct extension of the screen 18 or along the wall of a cylindrical metal shell connected somewhat outside the screen 18 and inclosing the front portion of the drum 6, whereby all the tailings are returned to the original place of inlet at the hopper end. The moment of power thus resulting is in the new mill considerably decreased by the metal shell 20 being located quite close to the grinding-drum 6, so that only a small space remains between them, which need not exceed the height of the axial or inclined guide-walls of the ordinary metal shells.

The tailings sliding from the screen 18 are conducted to the metal shell 20 by collecting-channels 21 of any suitable form. On the inside wall of the shell 20 are located the usual axial or inclined guide-walls 22, which extend almost or quite up to the drum 6, and on rotation of the mill conduct the tailings to the ordinary feed device 23, through which the tailings are finally returned to the drum 6 again.

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

1. In a ball-mill, in combination, a grinding-drum having perforation in one end of the circumference, screening means surrounding the drum at the perforated end, a return-feed shell surrounding the remainder of the drum and of smaller diameter than the outer screen, and means for conducting the partly-reduced material from the latter into the return-feed shell and from this into the grinding-drum, substantially as described.

2. In a ball-mill, in combination, a terminally-perforated grinding-drum, concentric conical screens surrounding it at the perforated end, a return-feed shell surrounding the remainder of the drum and of smaller di-

ameter than the outer screen, curved passages conducting from the latter into the return-feed shell, and means whereby the coarse material can pass from the said shell into the grinding-drum again, substantially as described.

In witness whereof I have hereunto signed my name, this 20th day of October, 1905, in the presence of two subscribing witnesses.

RICHARD BENEKE.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.