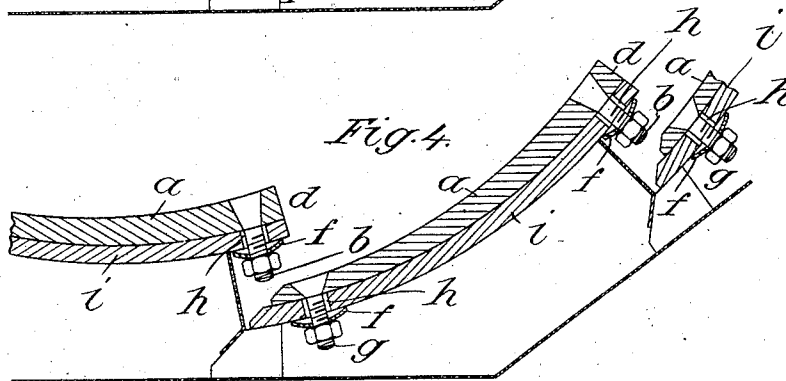
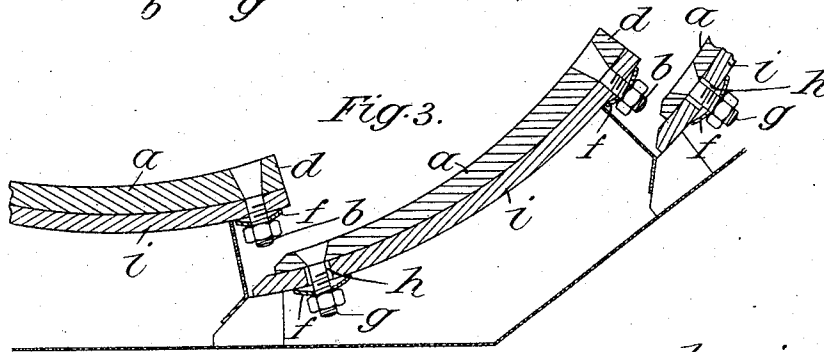
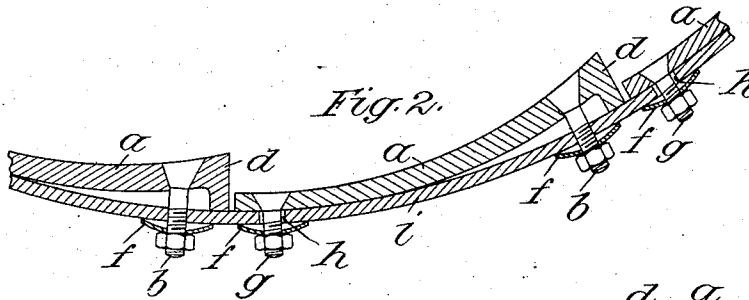
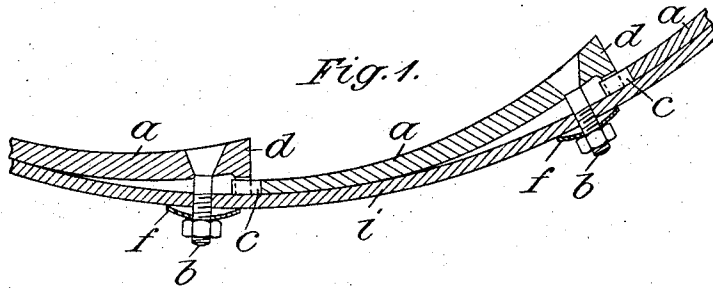


No. 851,013.

PATENTED APR. 23, 1907.

H. LÖHNERT.
BALL MILL.
APPLICATION FILED MAR. 6, 1906.



WITNESSES

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UNITED STATES PATENT OFFICE.

HERMANN LÖHNERT, OF BROMBERG, GERMANY.

BALL-MILL.

No. 851,013.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed March 6, 1906. Serial No. 304,571.

To all whom it may concern:

Be it known that I, HERMANN LÖHNERT, manufacturer, a subject of the King of Prussia, residing at No. 4 Bahnhofstrasse, Bromberg, in the German Empire, have invented new and useful Improvements in Ball-Mills, of which the following is a specification.

My invention relates to improvements in the method of securing the lining-plates of ball-mills disclosed in my United States Patent application, Serial No. 212,587, filed June 14, 1905.

The new invention consists in the provision of means whereby not only the pushing strains acting on the bolts, due to lengthening of the fibers of the plates, but also the pulling and bending strains, can be overcome.

Various forms of the invention are illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view showing a portion of the drum-shell of a mill with lining-plates secured according to this invention. Fig. 2 is a like view showing the invention applied to a second form of mill. Fig. 3 is a like view in the case of a mill of a third type. Fig. 4 is a similar view in the case of the same construction of mill, provision, however, being made to admit of extension of the liners in both directions.

Referring to the form of construction shown in Fig. 1, the tail end *c* of each lining-plate *a*, secured at its head end *d* to the drum-shell *i*, protrudes below the head end *d* of the adjacent plate, so that the bolts *b* of all the plates are relieved from pushing strains when the fibers stretch, owing to beating of the balls upon the plates.

In order also to avoid injurious bending and pulling strains in the bolts *b*, the heads or nuts of these bolts do not press directly against the shell of the drum, but against elastic disks or washers *f* inserted between the shell and the nuts, so that the bolts *b*, when the balls beat upon the plates, can shift in the direction of their axis—that is to say, can accommodate themselves to the

tendency of the plate ends to travel from the interior of the grinding-drum.

In the case of ball-mills of the constructions shown in Figs. 2 and 3—that is to say, of mills in which both ends of each liner *a* are bolted to the drum-shell independently of the other liners—the elastic washers *f* must be furnished below both the bolts *b* of the head ends and the bolts *g* of the tail ends of the plates *a*, the latter bolts *g* being passed through longitudinal slots *h* in the drum-shell, so as to make provision for lengthening of the plate fibers. The employment of elastic washers *f* is also advantageous when provision is made for lengthening of the fibers of the liners *a* in both directions—that is to say, when, for instance, both the bolts *b* and *g* pass through longitudinal slots in the drum-shell, as illustrated in Fig. 4. The slots *h* instead of being in the drum-shell may of course be provided in the liners *a*; but this arrangement will probably be found less advantageous, owing to the liability of the slots to become closed by the hammering action of the balls.

Having thus described my invention, what I claim as new is—

1. In ball-mills, in combination, a drum-shell and a sectional lining therefor, one of which members has longitudinal slots; bolts holding the sides of the lining-sections to the shell, those at the one side of the sections passing through the said slots; and resilient washers for the bolts; substantially as and for the purposes described.

2. In ball-mills, in combination, a drum-shell having longitudinal slots; lining-plates; bolts holding both sides of the same to the shell, those at one side of the plates passing through said slots; and elastic washers located between the nuts and the shell; substantially as and for the purposes described.

In witness whereof I have hereunto signed my name, this 20th day of February, 1906, in the presence of two subscribing witnesses.

HERMANN LÖHNERT.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.