

G. H. ROTHERHAM.  
TUBE MILL LINING.  
APPLICATION FILED FEB. 2, 1909.

939,637.

Patented Nov. 9, 1909.

Fig. 2.

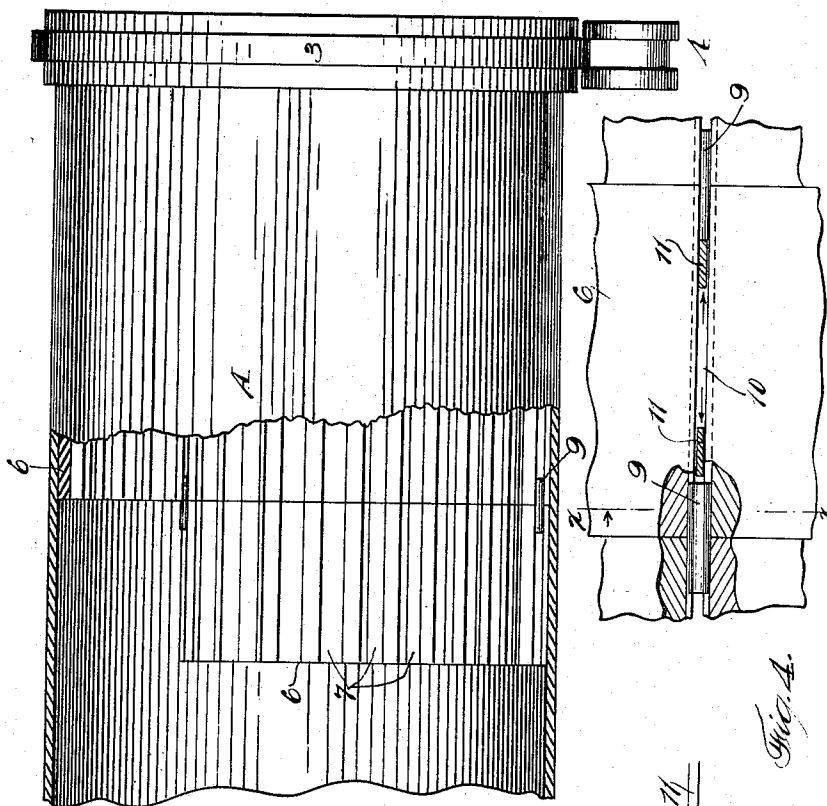


Fig. 4.

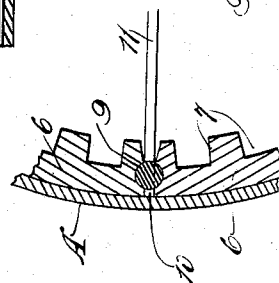


Fig. 3.

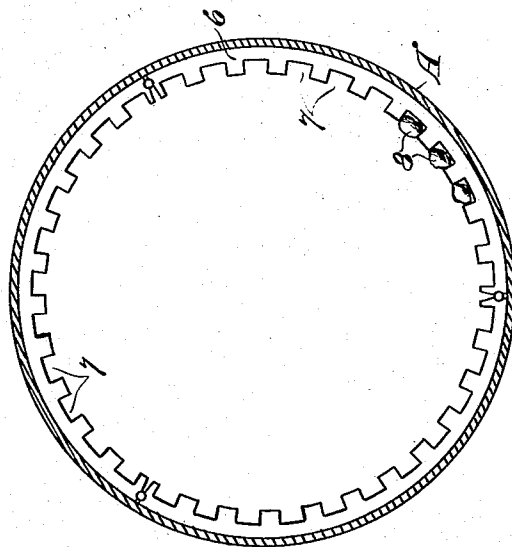


Fig. 1.

Witnesses:

F. E. Maynard  
R. L. Shraw

Inventor,  
George H. Rotherham,  
By Geo. H. Strong.  
his atty.

# UNITED STATES PATENT OFFICE.

GEORGE H. ROTHERHAM, OF TONOPAH, NEVADA.

## TUBE-MILL LINING.

939,637.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed February 2, 1909. Serial No. 475,647.

*To all whom it may concern:*

Be it known that I, GEORGE H. ROTHERHAM, a British subject, residing at Tonopah, in the county of Esmeralda and State of Nevada, have invented new and useful Improvements in Tube-Mill Linings, of which the following is a specification.

This invention relates to grinding-mills, and pertains especially to tube mills for use in grinding the ore for purposes of cyaniding.

The object of my invention is to provide a tubular mill with a removable and renewable sectional lining, and further provide a simple, practical and inexpensive means for securing the lining in place in the tube without in any way injuring or weakening the shell of the mill.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a transverse section through the mill, the liners being in elevation. Fig. 2 is a side elevation of a portion of a mill, partially in section, showing the liners in position. Fig. 3 is a detail section on line X—X, Fig. 4. Fig. 4 is a detail showing the locking pins in position.

A represents a cylindrical shell of suitable size and material having an annular bearing flange 3 at each end adapted to run on the supporting rollers 4, and revolved by the usual gearing (not shown).

The lining, which constitutes the main feature of the invention, consists of segmental plates or sections 6 having suitable grooves or corrugations 7 on its concaved face; the grooves extending transversely of the plates 6 and parallel with the length of the shell and receiving the flint pebbles 8 by which the actual grinding is done. These liner plates 6 may be of any suitable dimensions.

An important feature is the means by which the liners 6 are held in position circumferentially within the shell. By the means employed the sections are locked securely in place without rivets or bolts and without piercing the shell in any place. As here shown, each of the liners 6 has a channel or groove formed in its ends, the grooves running lengthwise of the shell. When the liners are assembled circumferentially in place in the shell, the channels

in adjacent side-by-side sections are coincident, and the channels of the abutting ends of sections in the same circumferential series register, so that the channels are adapted to receive suitable locking pins or keys 9 which may be of any desirable cross-sectional area and length. As each complete ring, or circumferential series, of liner plates 6 is set up, the pins 9 are driven in, leaving an end of each pin to aid in locking the plates of the next succeeding ring; thus the entire lining is locked in the tube without any injury to, or weakening of, the shell A.

The liner plates are made removable by having them spaced apart sufficiently, as shown at 10, so that a cold chisel or driving pin, as 11, may be inserted into the slot 10 behind a pin 9, and by means of a hammer, causing the pin 9 to be driven to one side so as to release that end of two sections which are in the same circumferential series. By loosening the pins at each side and each end of a plate, the latter can easily be taken out.

There may be any number of rings or circumferential series of plates placed end to end and removably locked by the pins 9. This is of great importance in the mining industry, where mills once started in operation are kept running night and day, the only time the mill is stopped being for cleaning up purposes, or for making repairs. It is, therefore, important to have the mill made as durable as possible, and to make any wearing parts readily removable and replaceable, as I have done.

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

1. A tube mill comprising a cylinder, and an inside lining for the cylinder consisting of segmental corrugated plates, the adjacent ends of the plates grooved longitudinally of the cylinder, and short keys fitting in said grooves and bridging the joint between the ends of contiguous horizontally aligned plates, each of said keys having one portion fitting the groove of one plate and having another portion extending beyond said plate and adapted to enter a horizontally aligned groove in the adjacent plate to thereby lock the plates in position in the cylinder.

2. In a tube mill, the combination of a cylinder having an inside lining comprising a plurality of segmental plates conforming to the curvature of the cylinder, the longitu-

dinal edges of the plates spaced apart sufficiently to allow a plate to be turned inwardly toward the axis of the mill to remove the plate without disturbing the others, and means fitting between these spaced longitudinal edges of the plates for holding the plate in position, independent of other fastening means.

3. In a tube mill, the combination of a cylinder, and an inside lining for the cylinder, consisting of a series of segmental plates, conforming to the curvature of the cylinder, the longitudinal edges of the plates spaced apart, and longitudinally grooved, with keys fitting in the grooves adjacent to the ends of the plates to lock the plates in

position in the cylinder, the spacing apart of said plates being sufficient to admit a tool between the plates, and to permit a key to be driven out endwise to release the plate, and the spacing between said plates also being sufficient to allow a plate to be turned inwardly toward the axis of the cylinder to remove a plate without disturbing the others.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE H. ROTHERHAM.

Witnesses:

H. R. COOKE,

EDWARD HAGERMAN.