

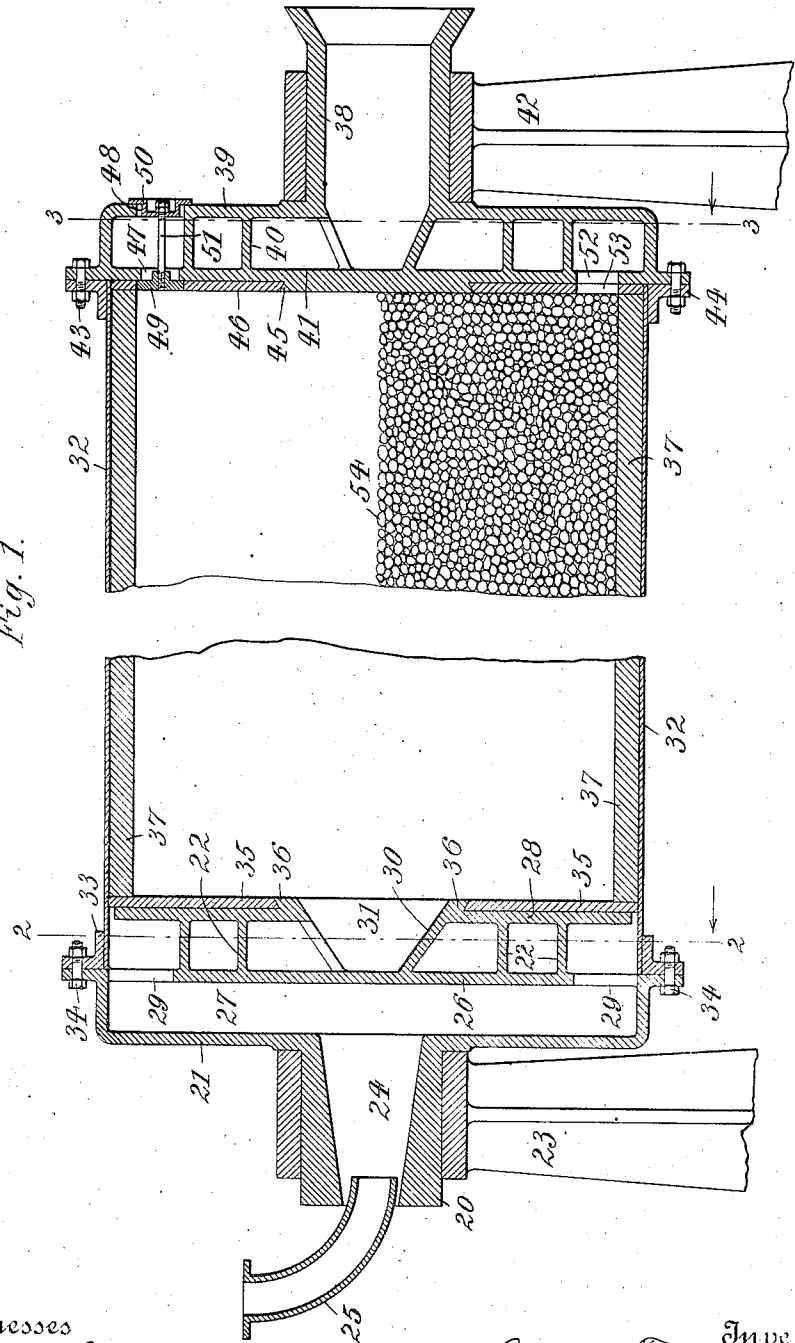
No. 841,841.

PATENTED JAN. 22, 1907.

M. F. ABBÉ.
TUBULAR BALL MILL.
APPLICATION FILED SEPT. 21, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



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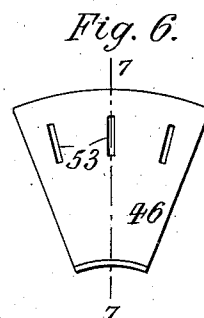
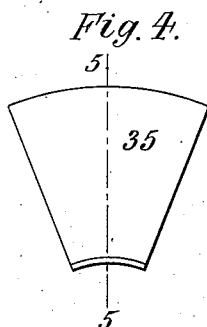
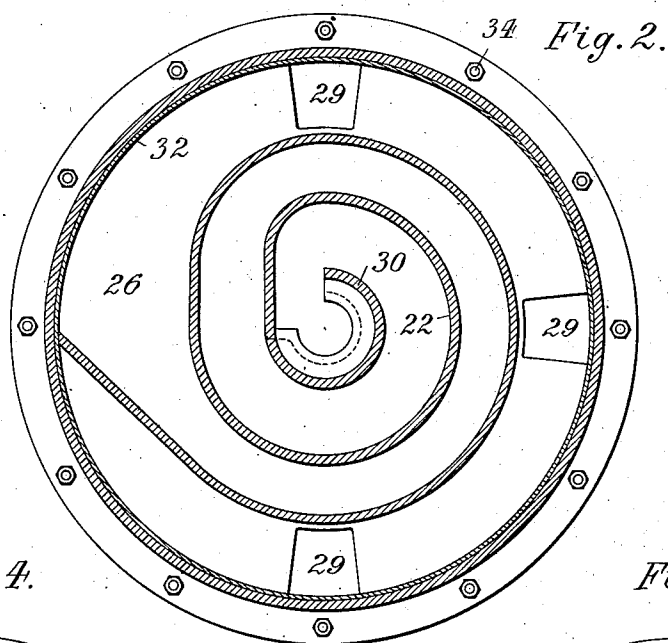


Fig. 3.

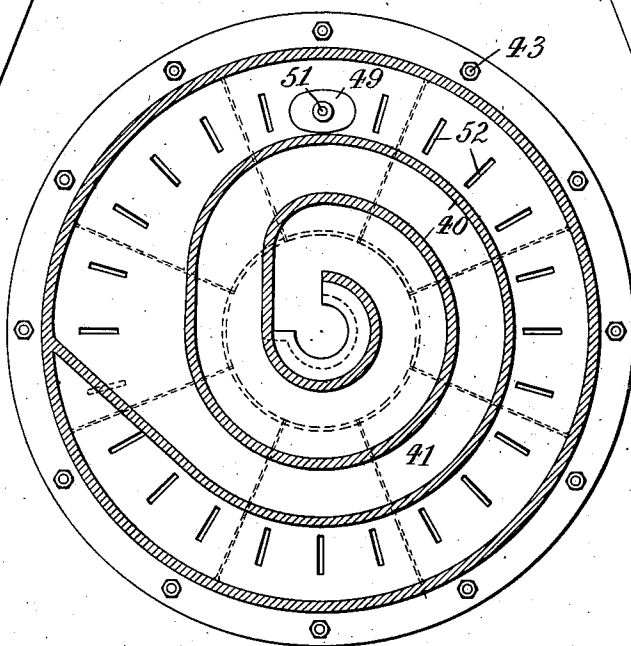


Fig. 5.

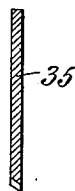
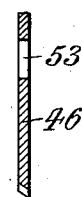


Fig. 7.



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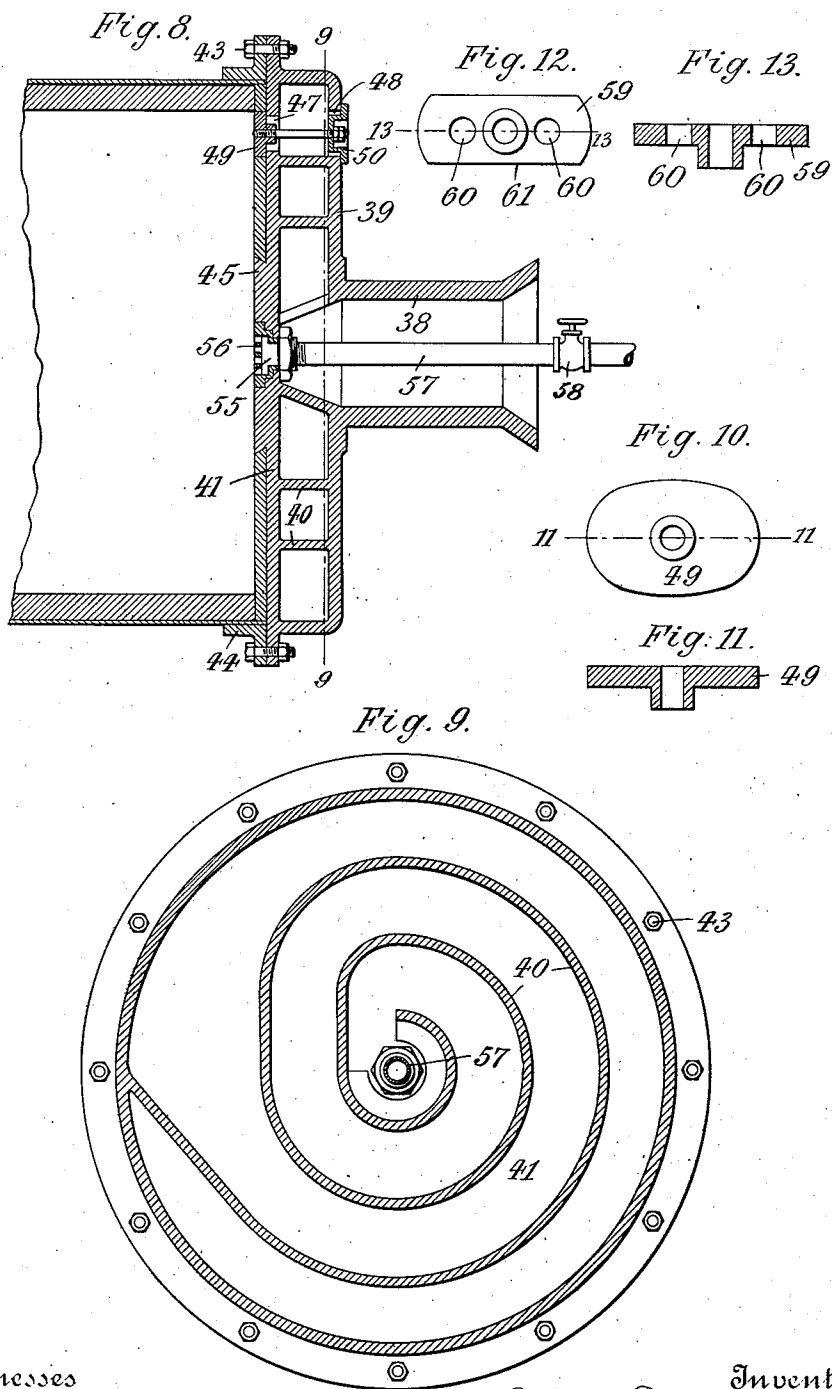
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3 SHEETS—SHEET 3.



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TUBULAR BALL-MILL.

No. 841,841.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed September 21, 1906. Serial No. 335,557.

To all whom it may concern:

Be it known that I, MAX F. ABBÉ, a citizen of the United States, residing at New York city, Manhattan, county and State of New York, have invented new and useful Improvements in Tubular Ball-Mills, of which the following is a specification.

This invention relates to a tubular ball-mill that revolves on hollow trunnions projecting outwardly from the heads of the mill and forming part of the feeding device.

By my invention the construction of the mill is simplified, its strength increased, and its length reduced without a corresponding reduction of its capacity.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my improved mill; Fig. 2, a section through the ingress-head on line 2 2, Fig. 1; Fig. 3, a section through the egress-head on line 3 3, Fig. 1; Fig. 4, a detail of the ingress-head liner; Fig. 5, a section on line 5 5, Fig. 4; Fig. 6, a detail of the egress-head liner when the mill is set for dry-grinding; Fig. 7, a section on line 7 7, Fig. 6; Fig. 8, a longitudinal section of a modification of the egress-head; Fig. 9, a section on line 9 9, Fig. 8; Fig. 10, a detail of the egress-head cover; Fig. 11, a section on line 11 11, Fig. 10; Fig. 12, a detail of a second egress-head cover; and Fig. 13, a section on line 13 13, Fig. 12.

The ingress-head of the mill is composed of three integral parts—namely, a trunnion 20, a flanged end plate 21, and a feed-spiral 22, or conveyer 22. The trunnion 20 is journaled in a support 23 and has a flaring bore 24, into which enters feed-pipe 25. The flanged plate 21 constituting the head proper is provided with an inner partition 26, forming a feed-chamber 27, that communicates with the bore 24 of trunnion 20. From the inner side of plate 26 extends the integral feed-spiral 22, flanked by an integral annular plate 28. Chamber 27 communicates with conveyer 22 through a number of peripheral openings 29 in partition 26, three of such openings being shown, Fig. 2. The innermost convolute 30 of conveyer 22 is flaring, so as to form a central discharge-funnel 31.

The ingress-head constructed as described is so bolted to the cylindrical shell or body 32 of the mill that partition 26 closes against the shell 32, while conveyer 22, with its plate 28, projects into the same. The means for

attaching the head to the shell consist of a flanged ring 33, fast on the shell and to which the flanged plate 21 of the head is bolted, as at 34.

To the inner face of the head are secured a number of abutting sector-shaped liners 35, Figs. 4 and 5, the inner beveled edges of which are engaged by an undercut inwardly-extending annular flange 36 of plate 28. At their outer ends the liners 35 bear against the tubular lining 37 of shell 32, so that in this way the liners are securely held in position.

The egress-head of the mill is constructed in substantial conformity with the ingress-head. Thus the hollow trunnion 38 is made integral with a flanged plate 39, carrying the spirals of the conveyer 40, the latter being in turn flanked by the inner plate 41. The trunnion 38 is journaled in the support 42 and communicates with the innermost flaring convolute of conveyer 40.

The egress-head is attached to shell 32 by means of bolts 43, engaging a flanged ring 44, fast on the shell. The inner plate 41 of the head has the undercut flange 45, that overlaps the beveled inner edges of the sector-shaped liners 46. Alined openings 47 48 in plates 41 and 39, respectively, are adapted to be closed by covers 49 and 50, connected by a screw-bolt 51.

In dry-grinding, Figs. 1-7, the interior of shell 32 communicates with the outer convolute of conveyer 40 by means of a series of peripheral slits 52 in plate 41, alined with corresponding slits 53 in liners 46. During the normal operation of the mill the material to be ground passes from feed-pipe 25 through hollow trunnion 20, chamber 27, and openings 29 to conveyer 22, that carries it into shell 32.

The material reduced by the pebbles 54 passes through openings 53 52 to conveyer 40 to be thence discharged from hollow trunnion 38. When the pebbles are to be removed or the mill is to be emptied entirely, cover 49 is opened, so that the contents of the mill will be fed out of shell 32 by conveyer 40.

For wet-grinding, Figs. 8-13, the peripheral openings in plate 41 are replaced by a central opening 55. This opening is protected by a grate or perforated plate 56 and discharges the pulp through pipe 57, having cock 58, by means of which the outflow is regulated. If the mill is to be emptied of its

pulpy contents, cover 49 is removed and replaced by a cover 59, Fig. 12, having openings that permit the passage of the pulp, but prevent the passage of the pebbles. As shown, cover 59 has openings 60 and mutilated or flat sides 61, so that segmental discharge-orifices are formed at the top and bottom of the cover.

It will be seen that in both heads of the mill the flanged plates forming the heads proper are made integral with the hollow trunnions. So also is each head provided with an integral spiral thread, which serves the double purpose of constituting a reinforcing-rib and of forming a conveyer for the material fed into or out of the mill. In this way the construction of the mill is simplified, while its strength is increased. Furthermore, the waste space heretofore formed by the reinforcing-ribs of the heads is utilized for the feeding device, so that the length of the mill is correspondingly reduced without diminishing its capacity.

I claim—

1. In a tubular ball-mill, a head composed of a flanged end plate, an integral hollow trunnion extending outwardly therefrom, a spiral conveyer extending inwardly therefrom, an inner plate having a beveled flange, and beveled sector-shaped liners engaging said flange, substantially as specified.

2. In a tubular ball-mill, an ingress-head composed of flanged end plate, an integral hollow trunnion, an inner plate, a perforated partition between end plate and inner plate, a feed-chamber between end plate and partition, and a spiral conveyer between partition and inner plate, substantially as specified.

Signed by me at New York city, Manhattan, New York, this 20th day of September, 1906.

MAX F. ABBÉ.

Witnesses:

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WILLIAM SCHULZ.