Sept. 15, 1925 1,553,328

A. J. ROUBAL

GRINDING MILL

Filed April 5, 1924

Fig. 2.

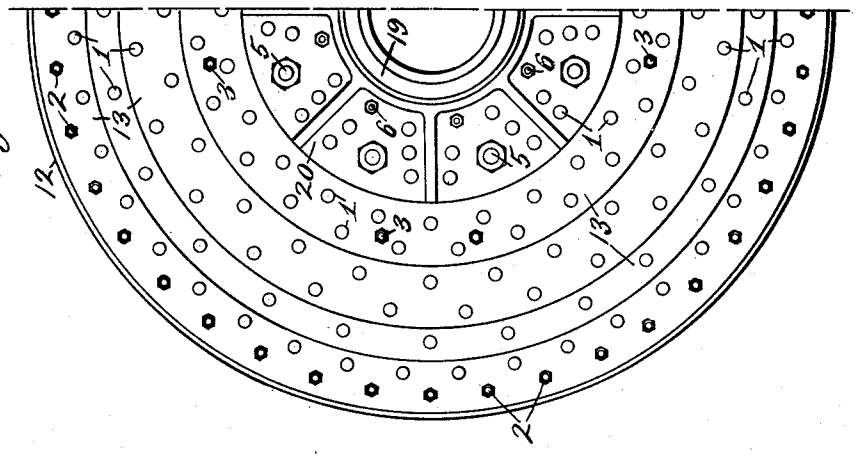
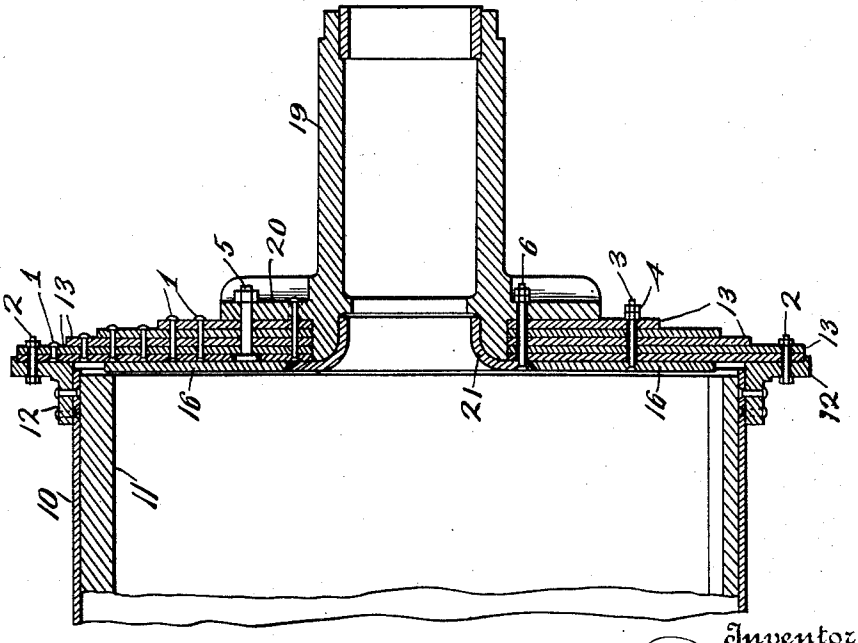


Fig. 1.



Inventor

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By his Attorneys

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UNITED STATES PATENT OFFICE.

ALEXANDER J. ROUBAL, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALLIS-CHALMERS MANUFACTURING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF DELAWARE.

GRINDING MILL.

Application filed April 5, 1924. Serial No. 704,304.

To all whom it may concern:

Be it known that I, ALEXANDER J. ROUBAL, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented certain new and useful Improvements in Grinding Mills, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in grinding mills.

The invention aims especially to provide an improved head for the revolving cylindrical drums of tube and similar mills of that type well known as ball or rod mills.

Heretofore, in mills of this general type, it has been customary to form the drum or shell heads of castiron or steel. From a manufacturing standpoint, however, these cast metal heads are not only expensive to make, but difficulty is experienced with such cast heads on account of shrinkage, and flaws are frequently present in the castings which are not observable until breakage caused thereby occurs while the mill is in use.

The present invention overcomes the above objections, by providing a head for the cylindrical grinding chambers of mills of the above type which is formed of a plurality of superposed steel plates.

In the accompanying drawings forming a part of this specification, there is shown for purpose of illustration one embodiment of the invention in a preferred form, and this construction will now be described in detail in connection with said drawings and the novel features forming the invention then be specifically pointed out in the claims.

In the drawings—

Figure 1 is a central section of a portion of a grinding mill and head embodying the present improvements, and

Figure 2 is an end view of the drum head, looking to the left in Fig. 1.

Referring now to the drawings, the numeral 10 indicates the shell of the grinding chamber for a mill of the type referred to, the usual liners 11 of any suitable form being secured therein in any well known manner, or to a ring 12 of angular cross section which is mounted on the shell 10.

In making up the improved head according to the present invention, a plurality of circular steel plates 13 are provided which are arranged in superposed relation to each other so as to form a laminated structure. The plates preferably and as shown are of different diameters and are arranged in the order of their diameters with respect to each other, the smallest plate being shown as on the outside of the head and the largest plate or plates on the inside, so as to enable the head to be conveniently secured to the ring 12. In the present showing, the two inner plates of the laminated structure are shown as of the same size, which is preferable with plates of the relative thicknesses shown, in order to secure the proper strength at the point of attachment to the ring 12. While five plates 13 have been shown, it will be understood that this number may be varied as desired. In order to provide a solid and durable structure and prevent shearing movement of the plates 13 with respect to each other, rivets 1, fitted to completely fill the holes therefor, are provided. These rivets preferably extend through all five of the plates within the area covered by the outside or smallest plate above named, the adjacent four plates likewise all being secured together by similar rivets extending therethrough within the area of the next smallest plate, and so on up to the largest inner plates, which are secured together by similar rivets and to the ring 12 by bolts 2. The laminated head thus made up is provided with an end liner 16, which preferably and as shown is secured in position by bolts 3 which extend through all five of the plates 13, the heads of these bolts being shown as countersunk in the liner 16 and the nuts 4 thereof thus being on the outside and near the edge of the smallest outside plate. The trunnion or gudgeon 19 on which the laminated head is also mounted, is provided with a flange 20 through which and the plates 13 holes are drilled for the reception of headed bolts 5, the heads of which are preferably countersunk in the larger inside plate 13. The orifice in the gudgeon 19 communicates with the interior of the drum, as usual in mills of this type. A ring liner 21 is therefore provided at this point, the edge of the flared portion of which and the edge of the circular opening in the end liner 16 are bevelled so as to provide a smooth surface

at the point where these two parts meet. The ring liner 21 may be held against displacement by bolts 6, the heads of which are countersunk in such liner, these bolts preferably extending through all of the plates 13 and the flange 20, as shown. The holes through the laminated head and flange 20 for the bolts 5 are preferably reamed for fitted bolts. Bolts 2 for holding laminated head to shell flange, bolts 3 for holding end liner 16 to laminated head, and bolts 6 for holding ring liner 21 to laminated head, are inserted in holes slightly larger than bolts used therein, which will aid materially in adjusting and removing such bolts when it is necessary to replace the liners or if for any reason it is desired to remove the laminated head.

It will be understood that various changes and modifications may be made in the construction and arrangement of parts herein shown and described, while still retaining the invention defined by the claims.

What is claimed is:

1. In combination, a shell, a trunnion located at an end of said shell, and a laminated head connecting said shell and said trunnion, said head comprising a plurality of coacting annular plates of progressively decreasing diameters the larger of which is located directly adjacent to said shell end.

2. In combination, a shell, a trunnion having an integral external flange located at an end of said shell, and a laminated head connecting said shell and said trunnion, said head comprising a plurality of coacting annular plates of progressively decreasing diameters the larger of which is located directly adjacent to said shell end and the smaller of which is located directly adjacent to said flange.

3. In combination, a shell, a trunnion having an integral external flange and a tubular extension projecting from said flange toward said shell, and a laminated head connecting said shell and said trunnion, said head comprising a plurality of coacting annular plates of progressively decreasing diameters embracing said tubular extension and secured to said shell and flange respectively.

4. In combination, a shell, a trunnion located at an end of said shell, a laminated annular head connecting said shell and said trunnion, and a ring liner having plane and tubular portions coacting with said head and trunnion respectively.

5. In combination, a shell, a trunnion located at an end of said shell, a laminated head connecting said shell and said trunnion, said head comprising a plurality of coacting annular plates of progressively decreasing diameters the larger of which is located directly adjacent to said shell end, and a ring liner having plane and tubular portions coacting with said head and trunnion respectively.

6. In combination, a shell, a trunnion having an integral external flange located at an end of said shell, a laminated head connecting said shell and said trunnion, said head comprising a plurality of coacting annular plates of progressively decreasing diameters the larger of which is located directly adjacent to said shell end and the smaller of which is located directly adjacent to said flange, and a ring liner having plane and tubular portions coacting with said head and trunnion respectively.

7. In combination, a shell, a trunnion having an integral external flange and a tubular extension projecting from said flange toward said shell, a laminated head connecting said shell and said trunnion, said head comprising a plurality of coacting annular plates of progressively decreasing diameters embracing said tubular extension and secured to said shell and flange respectively, and a ring liner having plane and tubular portions coacting with said head and with said trunnion extension respectively.

In testimony whereof, I have hereunto set my hand.

ALEXANDER J. ROUBAL.