

Jan. 9, 1940.

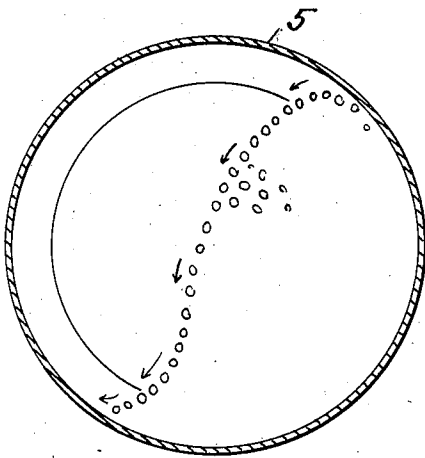
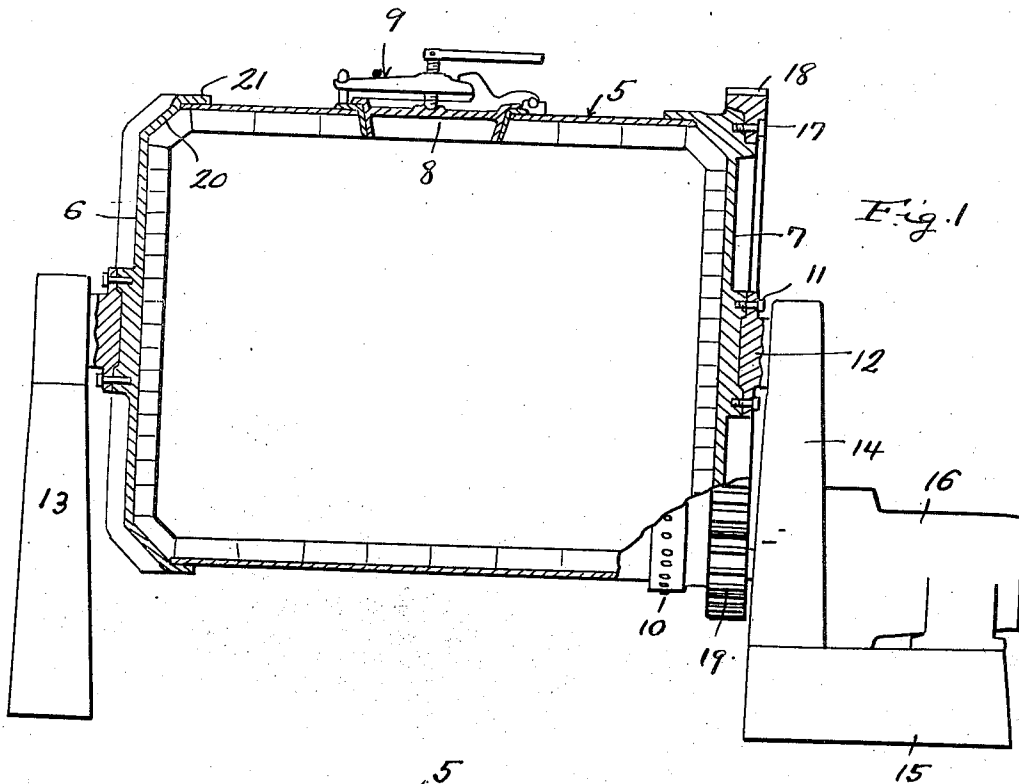
N. E. BROWN

2,186,164

MILL

Filed Dec. 30, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

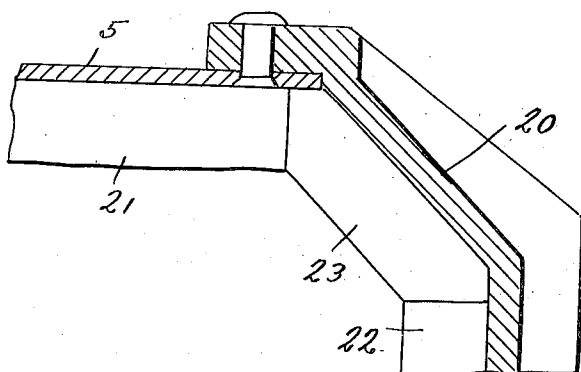


Fig. 2.

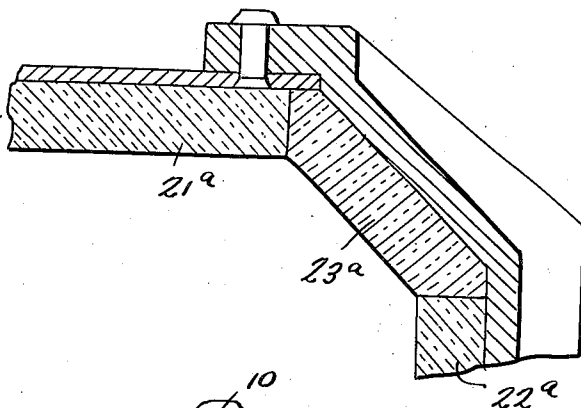


Fig. 3.

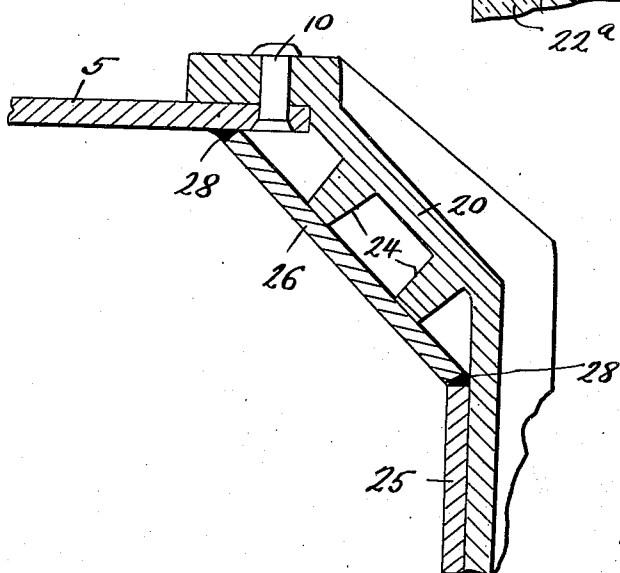


Fig. 4.

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UNITED STATES PATENT OFFICE

2,186,164

MILL

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Application December 30, 1937, Serial No. 182,602

1 Claim. (Cl. 83—9)

This invention relates to mills of the type used extensively for grinding and mixing raw commodities such as paints, chemicals, food stuffs, and the like, and which mills are generally known as pebble and/or ball mills.

Such mills are essentially "batch" mills, such being the term employed in view of the fact that the mill is charged with a grinding medium such as porcelain balls, French pebbles, or where the mill is unlined, with steel balls whereby the material in the mill is reduced or mixed during the operation of the cylinder of the mill.

An objection to the present type of mills of this character is the sharp corners formed at the joints between the peripheral wall of the cylinder or shell and the head or cap members for the shell. These sharp corners are objectionable mainly for the reason that material will collect and pack in such corners, and where it is necessary to clean out between batches considerable time and effort is used in removing the material from such corners.

An object of the present invention is to provide a mill of the character above mentioned wherein these corners and the objections thereto are removed; and the invention together with its objects and advantages will be best understood from a study of the following description taken in connection with the accompanying drawings wherein:

Figure 1 is a detail view partly in section and partly in elevation illustrating an improved mill,

Figures 2, 3 and 4 are detail sectional views each showing a form of the invention and illustrating a corner structure forming the salient feature of the invention, and

Figure 5 is a transverse sectional view through the cylinder of the mill showing the action of the grinding media therein.

Referring to the drawings by reference numerals it will be seen that in accordance with the present invention the grinding mill comprises a cylinder 5 having end or head plates 6, 7. The cylinder 5 is provided with a manhole for which a cover or lid 8 is provided and a suitable fastening device 9 for securing the lid 8 in position is shown in Figure 1.

The head plates or end members 6 and 7 telescopically fit the respective opposite ends of the cylinder 5 and are riveted or otherwise secured thereto as at 10.

Each of the head plates or end caps 6, 7 have suitably secured thereto as at 11 trunnions 12 and these trunnions 12 are journaled in suitable bearing standards 13, 14.

One of the bearing standards, for example, the standard 14, rises from a base 15 on which is mounted an electric motor or other suitable power device 16.

Bolted or otherwise secured as at 17 on one of the head plates or caps, in the present instance, the head plate or cap 7 is a gear 18 that is in mesh with a gear 19 on the shaft of the motor 16 whereby drive from the motor 16 is transmitted to the drum 5 for revolving the latter.

A salient feature of the present invention is the elimination of the right angle between the peripheral wall of the cylinder 5 and the end caps or head plates 6 and 7, and to this end each of the end caps or head plates 6 and 7 adjacent its peripheral edge is provided with an integral flange 20 that is disposed at acute angles to the respective head plates or end caps and the peripheral wall of the cylinder 5, with the flanges 20 of said head plates or end caps merging into circular flanges 21 through the medium of which latter flanges and rivets 10 or other similar fastening elements the respective end caps or head plates are secured to the cylinder 5.

This feature of the invention is clearly shown in Figures 1 to 4 inclusive and by so providing the flange 20 on each of the end caps or head plates the sharp angle usually existing at the joint between the cylinder and each end cap or head plate is eliminated with the result that the contents of the mill will not become lodged in the corners at these joints and consequently the time and effort usually required in cleaning out the mill is reduced to a minimum.

If desired, and as shown in Figure 2, the cylinder 5 is equipped with an interior lining 21 commercially known as "Buhrstone", and such a lining for the inner side of the head plates or end caps; with the inner surfaces of the flanges 20 faced or lined with a similar material as at 23. As shown in Figure 3 the lining elements therein indicated by the reference numerals 21a, 22a, and 23a, respectively, are of porcelain commercially known as "Por-C-Lin."

In Figure 4, instead of having the cylinder 5 lined as shown in Figures 2 and 3, the cylinder 5 is preferably formed of a very high grade steel commercially known as "Chrome-Manganese," and at the flange 20 thereof each of the end caps or head plates is formed internally with reinforcing ribs 24.

Also in this form of the invention the inner surfaces of the end caps or head plates are covered with linings 25 of steel, preferably the same

kind of steel as is used in the construction of the drum or cylinder 5, and forming a continuation of each lining 25 is a lining insert 26 that is parallel to the flange 20 and extends between the wall of the cylinder 5 and the marginal edges of the lining elements 25, the inserts 26 being welded or otherwise secured in place as at 27, 28.

In connection with the form of the invention shown in Figure 4 it will be noted that the lining inserts 26 join with the peripheral wall of the shell 5 materially inwardly from the end edges thereof thereby covering as it were the inner ends of the rivets 10 thus protecting the rivets from wear and also protecting the material which is being ground and mixed from contamination by the soft steel which would in time be worn off of the inner ends of the rivets.

It is thought that a clear understanding of the construction, utility and advantages of a ball

mill embodying the features of the present invention will be had without a more detailed description thereof.

I claim:

In a ball mill a cylindrical drum, head plates for the drum secured thereto at the respective opposite ends of the drum, and each of said head plates adjacent the marginal edge thereof being provided with an integral flange disposed at an obtuse angle to its respective head plate and to the peripheral wall of the drum, each of said head plates having reinforcing ribs on the inner side of its flange, and a lining element disposed within the confines of said flange and paralleling said flange, said liner element being welded at one edge thereof to the peripheral wall of the drum and at the other edge thereof to its respective head plate, as and for the purpose specified.

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