April 23, 1929. E. C. GREISEN 1,710,659

COMMINUTING MILL

Filed March 12, 1928

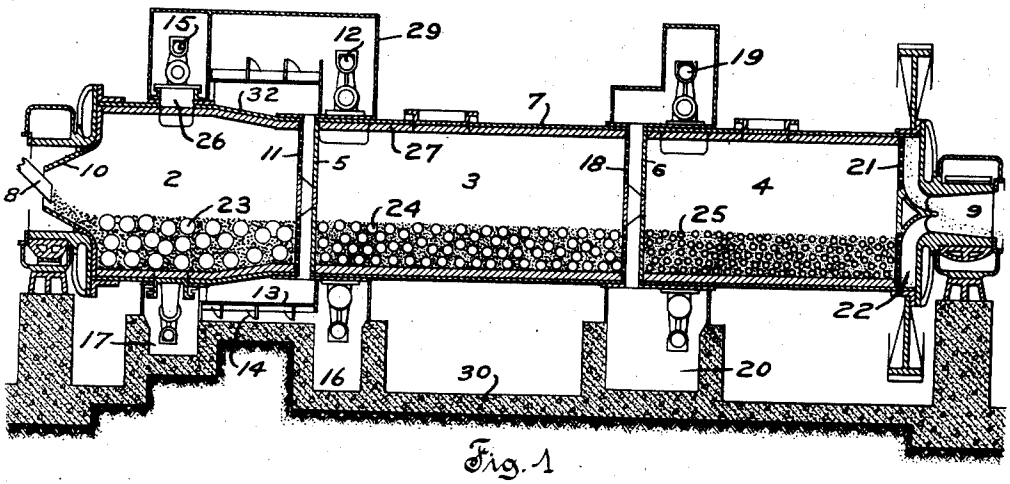


Fig. 1

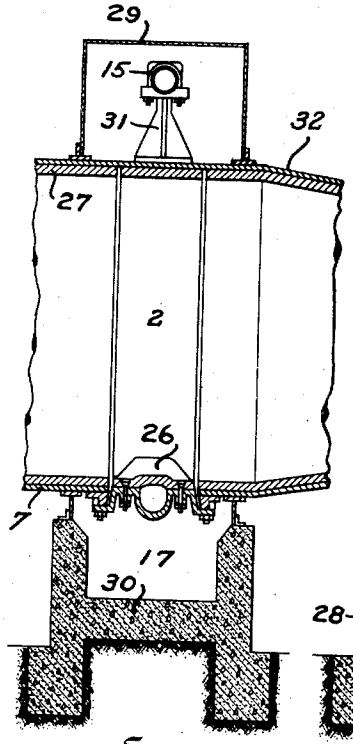


Fig. 2

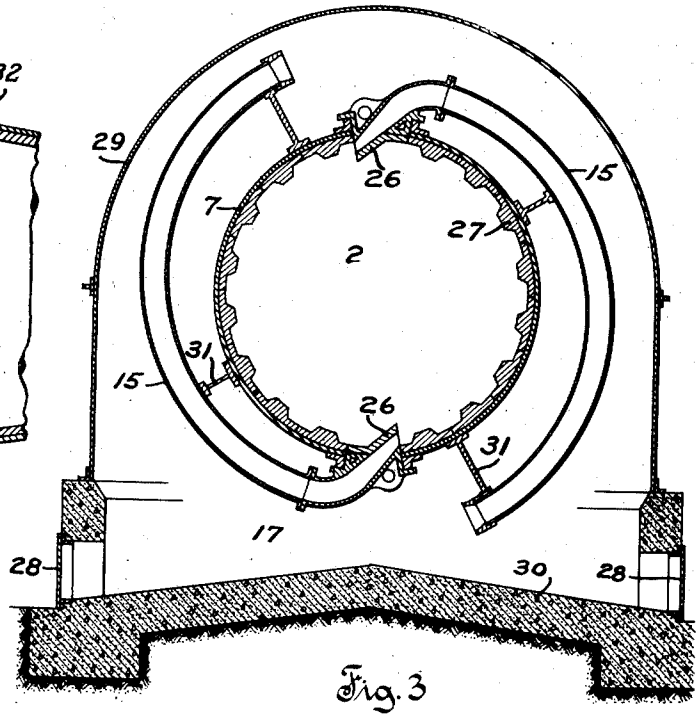


Fig. 3

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Patented Apr. 23, 1929. 1,710,659

UNITED STATES PATENT OFFICE.

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COMMINUTING MILL.

Application filed March 12, 1928. Serial No. 260,891.

The present invention relates in general to improvements in the construction and operation of comminuting mills of the type comprising a rotary drum forming one or more comminuting chambers having freely tumbling comminuting bodies therein.

An object of the invention is to provide an improved rotary comminuting mill of maximum strength and accessibility. Another object of the invention is to provide improved means for injecting material into a rotary comminuting mill and for effecting rapid removal of a charge of material and comminuting bodies therefrom. A further object of the invention is to provide improved means for effecting access to the interior of a comminuting mill, without undesirably weakening the mill structure. Still another object of the invention is to provide instrumentalities for effecting rapid removal of a charge of comminuting bodies and material from within a comminuting chamber having several different internal diameters. These and other objects and advantages of the invention will be apparent from the following description.

Some of the novel features of comminuting mill structure disclosed but not specifically claimed herein, form the subject of a copending application Serial No. 259,968, filed March 8, 1928.

A clear conception of an embodiment of the present improvement and of the manner of operating devices constructed in accordance therewith may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a somewhat diagrammatic central vertical section through a multiple compartment comminuting mill embodying the improvement.

Fig. 2 is an enlarged fragmentary central vertical section through a portion of the comminuting mill.

Fig. 3 is an enlarged transverse vertical section through a portion of the improved comminuting mill.

The multiple compartment comminuting mill specifically illustrated in the drawing comprises a shell or drum 7 having partitions 5, 6 therein which divide the drum 7 into a series of comminuting chambers 2, 3, 4. The drum 7 is supported upon end trunnions carried by a foundation 30, and is rotatable in a well known manner. The material to be reduced is admitted to the coarse grinding chamber 2 by means of a supply feeder 8 cooperating with an end liner 10, and is subjected to a disintegrating action by a charge of relatively large freely tumbling comminuting bodies 23 located within the coarse grinding chamber 2. After passing longitudinally through and being partially reduced within the chamber 2, the material is discharged therefrom through an internal end screen 11 associated with the partition 5, and is deposited within an annular outer screen 13 which is rotatable with the drum 7. The coarse grinding chamber 2 is preferably formed of relatively large diameter adjacent to the inlet end thereof, and is of smaller diameter adjacent to the screen 11, the enlarged portion thereof being connected with the portion of reduced diameter by means of a tapered intermediate section 32.

The material discharged through the outer screen 13 is urged longitudinally of the drum by means of a screw conveyer 14 attached directly to the screen 13, and is eventually deposited within a stationary receptacle 16. The material which fails to pass through the openings of the revolving screen 13 is delivered over an open end thereof into a stationary receptacle 17 where it is eventually picked up and returned to the intermediate enlarged portion of the coarse grinding chamber 2, by means of a pair of external spiral scoops 15. The scoops 15 are secured directly to the drum 7 and are rotatable therewith, each of the scoops being provided with a removable discharge portion 26, the function of which will be later explained.

The material delivered into the stationary receptacle 16 is eventually picked up by another set of spiral scoops 12, and is injected into the inlet end of the intermediate comminuting chamber 3 which has a charge of somewhat smaller freely tumbling comminuting bodies 24 therein. As the material advances longitudinally through the intermediate chamber 3 it is further reduced, being eventually discharged past an internal screen 18 associated with the partition 6, into another stationary receptacle 20.

The material thus discharged from the intermediate chamber 3 into the receptacle 20,

is eventually fed into the inlet end of the final or fine grinding chamber 4 by means of another set of spiral scoops 19 associated with the drum 7 adjacent to the inlet of the chamber 4. While passing longitudinally through the chamber 4 the relatively fine material is further acted upon by a charge of small freely tumbling comminuting bodies 25, being thus reduced to an extremely fine powder. The finally reduced material is discharged through an end grid 21 into the path of a series of elevating vanes 22 which ultimately deliver the fine product through a final end discharge opening 9 in a well known manner.

The several chambers 2, 3, 4 are provided with sectional liners 27 and the spiral scoops 12, 15, 19 may be housed within casings 29 in the ordinary manner. The entire mill is carried upon a suitable foundation 30 as shown, and the drum 7 and the screens and scoops associated therewith are simultaneously rotatable by means of gearing.

The external spiral scoops 12, 15, 19 are preferably of similar construction. Each of these scoops comprises a relatively long tubular portion extending transversely along the exterior of the drum 7 and rigidly attached thereto by means of supporting brackets 31. The discharge end of each scoop is formed as a detachable section 26 which when detached provides a relatively large opening or manhole for permitting convenient access to the adjacent comminuting chamber. The discharge sections 26 are also formed as injection nozzles for effectively introducing the material into the mill during rotation thereof. When utilizing scoops 15 for injecting material into a comminuting chamber 2 having various internal diameters, it is preferable to locate these scoops at the portion of the chamber 2 having maximum diameter, so that when it is desired to remove the charge of material and comminuting bodies 23 from within such a chamber through the opening afforded by removal of a scoop section 26, the material will naturally flow toward the opening thus provided. The receptacle from which the scoops normally remove material for injection into the mill, may be provided with a sloping floor and delivery doors 28 as shown in Fig. 3, for the purpose of permitting convenient removal of a dropped charge from within the receptacle.

From the foregoing description it will be apparent that by making the scoop sections 26 readily removable, the use of special manholes for permitting access to the interior of a comminuting chamber becomes unnecessary. This feature is of considerable advantage in cases where it is impossible to provide the necessary space for a manhole. By eliminating the use of additional manholes, the structure of the drum 7 may be considerably strengthened, where such strength is essential. By locating the scoops 15 at the portion of a comminuting chamber having greatest diameter, the charge is obviously more readily removable since the material and comminuting bodies tend to gravitate toward such enlarged portion of the chamber. The structure is obviously extremely simple and compact and the sections 26 may be quickly removed in order to permit access to the interior of the mill.

It should be understood that it is not desired to limit the invention to the exact details of construction and operation herein shown and described for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In combination, a rotary drum forming a comminuting chamber, and an external scoop for injecting material into said chamber through the periphery of said drum during rotation thereof, a portion of said scoop being formed detachable from the exterior of said drum to provide an opening for effecting direct removal of material from within said chamber.

2. In combination, a rotary drum forming a comminuting chamber, and a spiral scoop associated with said drum for injecting material into said chamber through the periphery of said drum during rotation thereof, the discharge portion of said scoop being formed detachable from the exterior of said drum to provide an opening for effecting direct removal of material from within said chamber.

3. In combination, a rotary drum forming a comminuting chamber, means for discharging comminuted material from an end of said chamber, and an external spiral scoop for injecting material into said chamber intermediate the ends thereof during rotation of said drum, a portion of said scoop being formed for detachment from the remainder of said scoop and form the exterior of said drum to provide an opening for effecting direct access to said chamber.

4. In combination, a rotary drum forming a comminuting chamber, means for admitting material to one end of said chamber, means for delivering material from the opposite end of said chamber, and an external spiral scoop for injecting additional material into said chamber intermediate the ends thereof, the discharge portion of said scoop being formed detachable from the exterior of said drum to provide an opening for effecting direct access to said chamber through the periphery of said drum.

5. In combination, a rotary drum forming a comminuting chamber, a plurality of freely tumbling comminuting bodies within said chamber, and a spiral scoop for injecting material into the portion of said chamber

having maximum diameter through the periphery of said drum, a portion of said scoop being formed for removal from the exterior of said drum to provide an opening for effecting free discharge of said comminuting bodies from said chamber.

6. In combination, a rotary drum forming a comminuting chamber having a medial portion of larger diameter than an end portion thereof, and an external scoop for injecting material to the portion of said chamber having largest diameter through the periphery of said drum, the discharge portion of said scoop being formed detachable from the exterior of said drum to provide an opening for effecting direct removal of material from within the portion of said chamber having greatest diameter.

7. In combination, a rotary drum forming a comminuting chamber having an enlarged medial portion, a plurality of freely tumbling comminuting bodies within said chamber, means for admitting and discharging material to and from the opposite ends of said chamber without permitting escape of said comminuting bodies, and an external spiral scoop secured directly to said drum and rotatable therewith to inject material into the portion of said chamber having greatest diameter through the periphery of said drum, the discharge portion of said scoop being formed for detachment from the remainder thereof and from the exterior of said drum to provide an opening for effecting direct removal of a charge of comminuting bodies and material from within said chamber.

In testimony whereof, the signature of the inventor is affixed hereto.

ELIJAH C. GREISEN.

CERTIFICATE OF CORRECTION.

Patent No. 1,710,659. Granted April 23, 1929, to

ELIJAH C. GREISEN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 111, claim 3, for the word "form" read "from"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of May, A. D. 1929

M. J. Moore,
Acting Commissioner of Patents.

(Seal)