Nov. 2, 1937. E. B. MYERS 2,097,890

ROTARY GRINDER

Filed Sept. 6, 1928

Fig. 1.

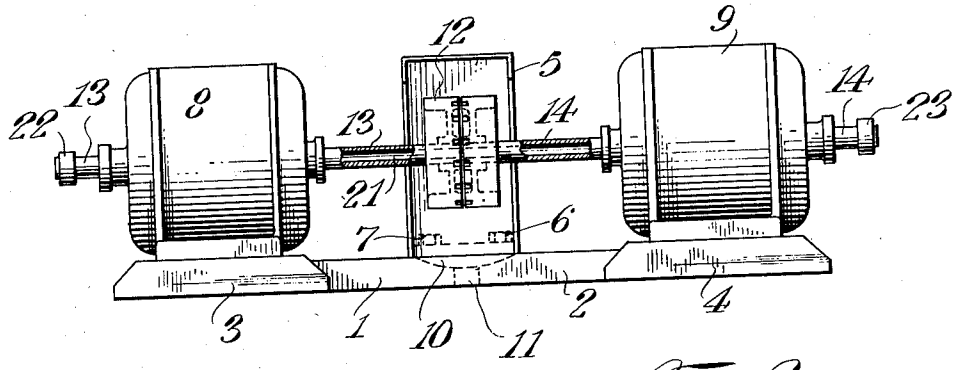


Fig. 2.

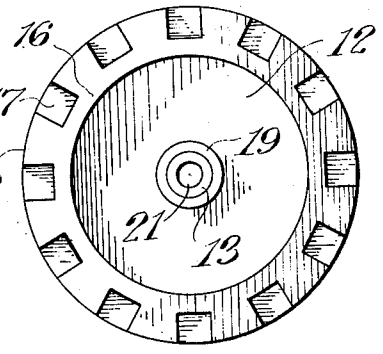


Fig. 3.

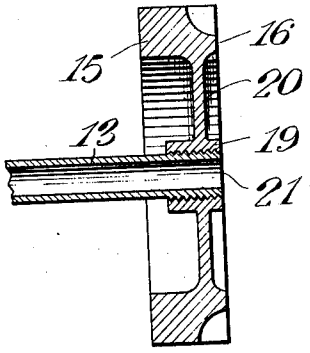
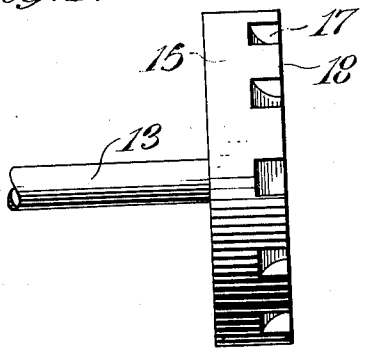


Fig. 4.



Inventor

Elman B. Myers

By his Attorney

Howard W. Bint

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ROTARY GRINDER

Elman B. Myers, Norristown, Pa., assignor of ten percent to Howard W. Dix, New York, N. Y.

Application September 6, 1928, Serial No. 304,337

2 Claims. (Cl. 83—8)

This invention relates to improvements in rotary grinding apparatus and more particularly to an improved assembly of feeding means associated with an improved grinding element.

In my co-pending application, S. N. 301,804, filed August 24, 1928, for Rotary grinding apparatus, which became Patent No. 1,995,549 on March 26, 1935, there has been disclosed an improved rotary grinding element which is adapted to provide improved results in grinding and is more particularly adapted for colloidizing and emulsifying generally.

In the structures disclosed in the aforesaid application the materials to be treated may be fed through a hollow rotor shaft to the grinding elements and forced outwardly through the grinding surfaces. Where it is desired to grind a plurality of materials, it is necessary to preliminarily mix the materials before introducing them to the grinding machine. As such action involves delays and in the case of materials which are adapted to react with each other may give rise to undesirable side reactions.

It is an object of the present invention to provide an improved grinding assembly which is adapted to permit increased speed in grinding while at the same time preventing unnecessary preliminary treatment.

It is a further object of this invention to provide an improved method of feeding materials to grinding apparatus of the rotary type whereby there is secured a distinct saving and economy in overall size of the unit as well as efficiency in operation.

It is a further object of this invention to provide an improved process for the mixing and grinding of a plurality of substances adapted to form colloidal suspensions, emulsions, dispersions, etc.

These and other desirable objects and advantages of the present invention will be described in the accompanying specification and illustrated in the drawing, certain preferred embodiments being shown by way of illustration only, for since the underlying principles may be incorporated in other specific mechanical devices it is not intended to be limited to the one shown except as such limitations are imposed by the appended claims.

In the drawing like numerals refer to similar parts throughout the several views, of which

Fig. 1 is a front elevation partly in section of an improved rotary grinding apparatus;

Fig. 2 is a front plan view of an improved rotary grinder adapted to be used in the device shown in Fig. 1;

Fig. 3 is a vertical section of a rotary grinding element showing the hollow feeding shaft and the offset rim construction; and

Fig. 4 is a side view of a rotary grinding element and its hollow shaft showing the peripheral shearing teeth.

In the construction shown in Fig. 1 there is shown a common base, 1, having a central portion, 2, and end portions, 3 and 4. Mounted on section 2 is a grinder housing, 5, of any suitable configuration, secured to the base by suitable means, such as headed bolts, 6, 7. On sections 3 and 4 of the common base are mounted motors, 8 and 9, which are secured to the base in any suitable manner.

The central section, 2, of the base is dished at 10 interiorly of the housing, 5, to form a collecting basin which is adapted to discharge through the orifice, 11, to any suitable pipe line or container.

The grinding elements proper comprise a plurality of disc members, 12, mounted for rotation on shafts, 13, 14. The grinding elements comprise peripheral rims, 15, having grinding surface, 16, and provided with slotted portions, 17, defining teeth, 18.

The rim of the grinder is attached or connected to the hub, 19, by a web member, 20, substantially as described in my Patent No. 1,995,549, previously referred to. As pointed out in the above identified application, when the grinding elements are rotated the faces, 16, are brought into grinding relation by the conjoint action of the mass of the rim, 15, and the peripheral speed imparted thereto. The rotor is mounted in any suitable manner upon the shaft as above noted, the shafts being hollow as indicated at 21, to serve as inlet for the materials to be ground.

As previously intimated desirable economies are effected by providing the rotor assembly and the driving mechanism such as the motors, 8 and 9, with common shafts, 13 and 14. These shafts are hollow throughout for a purpose which will now be described. This construction permits the motors to be aligned on the common base, 1, and further to be closely juxtaposed so as to permit the shaft section between the motor and the rotor housing to be made as short as is desirable. This permits the elimination of supporting bushings in the walls of the housing, although it will of course be understood that they may be included therein without departing from the spirit of the present invention.

The shafts, 13 and 14, are provided with the usual collars, 22, 23, adapted to form a fluid tight

coupling between the rotating members and the supply lines.

In operation the materials to be ground may be fed to the grinding surfaces through either or both shafts, the resulting material being collected in the receptacle, 10, and withdrawn through the outlet, 11. As is usual in colloid mills of the type described, the materials may be fed through under pressure or by gravity feed as desired. It is to be noted further that while two contra-revolving opposed grinding discs have been shown, the construction may involve one rotary member acting against a fixed member.

As disclosed in my Patent No. 1,995,549, previously referred to, peripheral grinding teeth were provided to secure a maximum shearing effect on the material under treatment. These grinding teeth were formed by slotting the outer edge of the grinding rim to a considerable depth. It has now been found that efficient results can be secured by merely providing the rim, 15, with arcuate depressions, 17, above referred to, which form cutting portions, 18, without involving removal of any great amount of metal from the rim, thereby retaining the full advantage of the weight of the rim when coupled with the centrifugal moment imparted thereto by high peripheral speeds attained during rotation.

By feeding a plurality of different materials through the several shafts, 13 and 14, in any desired proportion, it will be seen that the construction of the present invention permits the formation of a colloidal suspension or emulsion having any desired ratio of constituent elements, the ratio being determined by the relative speed of feeding from either supply or the proportions of the materials contained in the respective feeds. Such a construction imparts a high degree of flexibility in operation to the device of the present invention and renders it susceptible to a wide variety of uses, without involving the necessity of varying the mechanical parts of the structure per se.

It will now be seen that there has been provided an improved rotary grinding apparatus characterized by novel feeding means resulting in a marked decrease in size, as well as permitting a high degree of flexibility in operation of the device. The grinding members are adapted to automatically accommodate themselves to each other as more fully set forth in my Patent No. 1,995,549, previously referred to, and the improvements of the present invention are to be considered in the light of the disclosure of the aforesaid application.

What is claimed is:

1. A rotary grinding element, comprising a hollow hub portion, an intermediate flexible support, and a rim portion secured to the support, and having a flat grinding surface lying in substantially the same plane as the support, the center of gravity of the rim mass and the grinding surface lying on opposite sides of the flexible support, whereby the grinding element is adapted, on rotation, to be flexed in the direction of the grinding surface, said flat grinding surface being provided with a plurality of peripheral depressions in the grinding surface adapted to serve as cutting members whereby to provide a shearing action of materials issuing from the grinding surface, a majority of said depressions being of substantially equal width from their beginnings in the grinding surface and continuing into the periphery of said rim portion, and having the depths of said depressions varying substantially on the arc of a circle, said depressions extending only part way through said rim.

2. A grinding machine, including, in combination, a pair of rotated grinding elements adapted for counter-revolving grinding contact, a casing for the rotating elements, a fluid outlet for the casing, a stand for the casing, a pair of motors mounted on the stand and on either side of the casing, hollow shafts in the motors, the said grinding elements being severally mounted in the casing and on the inner abutted ends of the hollow shafts, the said motors, shafts and grinding elements being aligned in operating relationship; the said rotary grinding elements each comprising a hollow hub portion mounted on one of said hollow shafts, an intermediate flexible support and a rim portion secured to the support, the center of gravity of the rim portion and the grinding surface thereof, lying, respectively, on opposite sides of the flexible support, whereby each grinding element is adapted, on rotation, to be flexed in the direction of the grinding surface, the grinding surfaces being further provided with cutting sections formed therein and adapted to serve as cutting members whereby to provide a shearing action on materials delivered through the hollow motor shafts to the coacting grinding faces of the grinding elements, said cutting sections being in the form of depressions of substantial uniform width and extending from the grinding surface to the periphery of said grinding element, the bottoms of said depressions formed substantially on the arcs of circles.

ELMAN B. MYERS.