Sept. 7, 1954 H. F. LENZ 2,688,448

PEPPER MILL

Filed Dec. 19, 1950

Fig. 1.

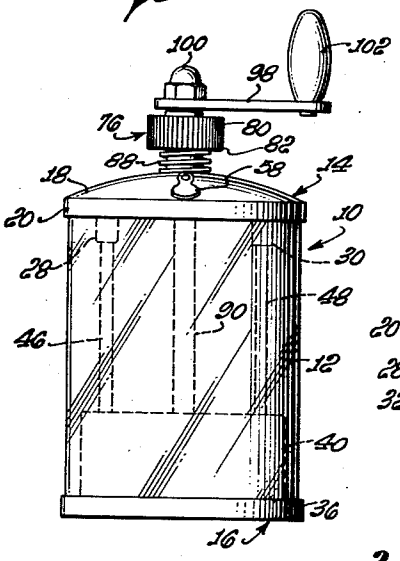


Fig. 2.

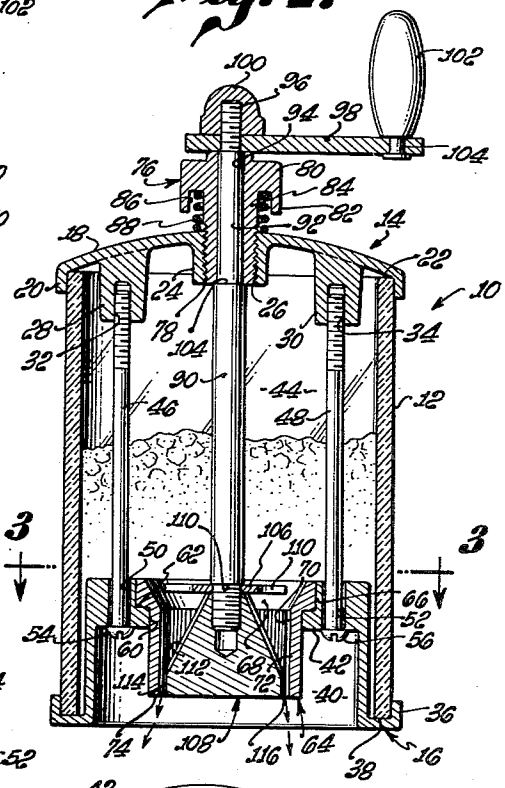


Fig. 3.

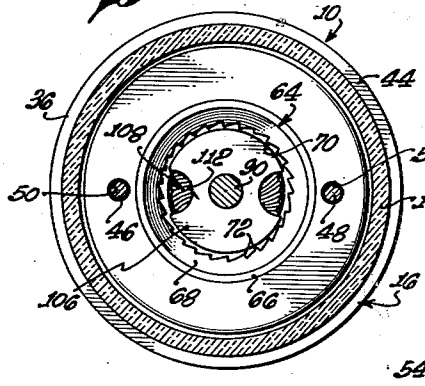


Fig. 4.

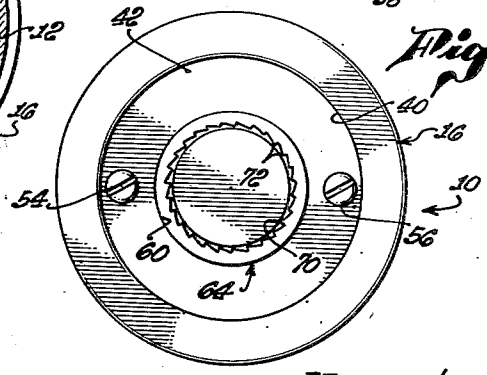
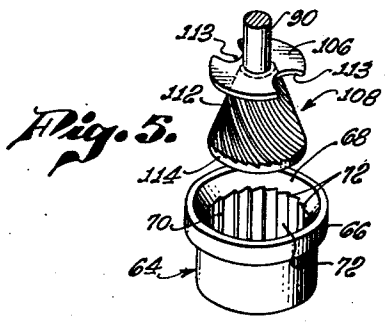


Fig. 5.



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Patented Sept. 7, 1954

2,688,448

UNITED STATES PATENT OFFICE

2,688,448

PEPPER MILL

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Application December 19, 1950, Serial No. 201,655

3 Claims. (Cl. 241—168)

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This invention relates to a grinding mill of the type commonly known as a "pepper mill" and used to grind spices and other coarse granular material which it is desired to reduce more-or-less to a powder. Such a device serves as well as a storage container for the grindable material which conveniently is only ground and emitted from the container a little at a time as needed.

It is an object of the invention to provide such a grinding mill having ready adjusting means for changing at will—even during operation—the grade of fineness to which the material is ground.

Still another object is to construct a compact, handable mill which is easily assembled and dissembled for either fabrication, storage or cleaning.

Yet another object is to provide such an improved grinding mill embodying a bottom outlet having vertically adjustable grinding means disposed therein, which means at the same time serve as a closure for the outlet when not in use, and which outlet can be further sealed against entrance of air by merely standing the mill on a flat surface.

Other and further objects and advantages of my invention will become apparent from the drawings and the specifications relative thereto.

In the drawings:

Figure 1 is a side elevational view of my spice mill.

Figure 2 is a vertical sectional view showing the internal construction thereof, with portions seen in side elevation.

Figure 3 is a transverse sectional view taken through the mill along the line 3—3 of Figure 2.

Figure 4 is the bottom plan view of the mill.

Figure 5 is an exploded prospective view of the grinding member and the tubular bushing within which it works.

As here illustrated my invention is embodied in a handable housing 10 formed of a tubular side wall 12 disposed between a top 14 and bottom 16 closure. The top closure is formed with an arcuate or dome-shaped upper surface 18 which at its edges is turned down to form a peripheral lip 20 which snugly overlies the top edge 22 of the side wall. The under-face of the top is formed with three diametrically aligned projections or bosses, the central one 24 of which is axially apertured and provided with internal screw threads 26. The two lateral bosses 28, 30 are provided with downwardly opening sockets 32, 34 which are in turn also threaded.

The bottom closure 16 is formed with outwardly projecting upwardly opening, substantially

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U-shaped footing rim 36 which receives the lower edge 38 of the side walls 12 in the groove thus formed. Along the inner face of the side wall, the bottom closure extends upward parallel thereto in a cylindrical section 40 which is terminated at the top in a horizontal platform 42 which serves as a floor for the inner chamber 44 of the housing. The floor 42 is likewise apertured at three places in alignment with the corresponding bosses and apertures of the top closure 14 thereabove.

Fastening means such as a pair of bolts 46, 48 are inserted through the lower side apertures 50, 52 of the floor, and their upper threaded ends received in the corresponding sockets 32, 34 so that with their enlarged heads 54, 56 pressed in abutment against the lower face of the floor 42, the opposing closures 14, 16 are thus held securely against the top and bottom edges of the tube 12 so as to form an inner spice chamber 44. Access to the chamber 44 may be had without dissembling the device, by means of a swinging or sliding cover panel 58 in the top closure (Figure 1). Access is also afforded by other means as will be noted hereinafter.

The central aperture 60 in the floor 42 is provided with an inner peripheral step 62 upon which is fixedly supported a tubular busing 64 having an upper shoulder 66 correspondingly dimensioned to the step 62 so as to be press fit therein. Internally the tubular bushing is provided with an upper funnel-shaped mouth 68 which is succeeeded by a dependent channel section 70. The latter is formed with a peripheral series of longitudinal extending flutings or grooves 72 (Figure 5) which continue to the lower edge thereof.

A bearing member 76 is mounted in the central aperture of the top 14 by means of an externally threaded shank 78 which engages the threads 26 of the boss 24. The top of the bearing is provided with an outwardly flanged head 80 having a downwardly extending annular skirt 82 which is laterally spaced apart from an unthreaded portion 84 of the shank so as to define a groove 86 therebetween. A helical spring 88 is partially housed in the groove, extending down the shank beyond the same so as to abut against the arcuate surface 18 of the top closure. The spring bears upwardly against the head 80 so as to hold the bearing in a substantially permanent position at whatever level of elevation it may be set by screwing it up or down within the box 24.

Within the central chamber 44 there is located a central shaft 90 axially traversing the chamber

and having an upper section 92 of reduced diameter which is rotatably received within a corresponding aperture 94 of the bearing 76. The upper terminus 96 of the shaft is externally threaded and receives thereupon in screw threaded engagement successively an operating lever 98 and a cap screw 100. A hand hold or handle 102 extends upwardly from the outer end of the lever 98, being freely rotatable therein by means of a stub shaft 104. The cap screw 100 mounted upon the end of the shaft 90 serves both to mount the operating lever 98 on the shaft and to hold the central section of the latter in uplifted position, that is with its intermediate shoulder 104 in abutment with the lower end of the threaded shaft 78. Accordingly, by screwing the bearing 76 up or down within the boss 24, the shaft 90 is correspondingly raised or lowered within the spice chamber for a purpose which will be subsequently apparent. However, tension of the spring 88 between the top closure 14 and the bearing 76 restrains the latter from simultaneous rotation with the bearing and shaft.

The lower extremity of the shaft 90 is also radially restricted and externally threaded so as to receive thereon successively a disk 106 and grinding member 108, the latter being threadedly mounted thereon so as to lock the disk against the shoulder 110 of the shaft. The grinding member is generally frustro-conical in outline and with its larger diametered portion disposed adjacent the bottom of the bushing 64. The tapered sides of the member are formed with arcuate flutings or ridges 112 disposed thereabout in a general helical or whirling pattern. The disk 106 is formed with a pair of outwardly opening cutouts 113.

As may be seen by reference to Figures 2 through 5, the grinding member 108, even in its largest diameter at 114 is of lesser diameter than the depending cylindrical channel section 70, in which it is adapted to turn, so that it is possible merely by unthreading the bearing 76 by means of the flanged and most desirably knurled head 80 thereof, to retract said grinding member entirely through the cylindrical section 70. The mill may thereby be readily filled from the bottom side, and the bearing 76 rethreaded so as to substantially close the opening of said cylindrical portion 70 by means of the grinding member before righting the mill.

The disk 106 functions as a compression member in that material to be ground, after passing through the openings 113, is substantially prevented from surging upwardly back into the main chamber 44 by virtue of the grinding movement of the member 108. The material to be ground, or in the course of being ground, is thereby substantially compacted and forcibly retained within a chamber defined by the interior walls of the bushing 64, the fluted surface 112 of the grinding member and said disk 106. As ground material is emptied from said last defined chamber, additional unground material comes through the openings 113. Such material also comes through said openings at every opportunity permitted by the normal turbulence and jostling of the material being ground below the disk 106, Positive cutting action is thus achieved and is accentuated by the whirl-shaped flutes 112, which have a substantial threading action.

The verticality of the flutes 72 permits the ground material to drop freely from the grinding chamber bushing 64, regardless of the position of relative elevation of the grinding member 108 therein, so that a residue of ground material is not retained on the flutes 72 as would occur if such flutes were spiral or other than perpendicular.

The disk 106 also serves to prevent forcing or leakage of the partially comminuted material within the grinding chamber, i. e., within the bushing 64, as might normally be imposed by the weight of the superincumbent material in the main chamber 44, whose weight for such undesired purpose is, in the instant invention, effectively borne upon the disk 106 during non-use of the mill.

Accordingly, it will be seen that the spice or other material that passes the disk 106, either along its edges or through the openings 113, will fall in the space between the whirling ridges 102 of the grinder, and the axial ridges 72 of the bushing, and consequently will be ground finer the further down the frustro-conical surface it travels until it is moved out past the terminal edge 114 of the grinder and dropped through the outlet mouth 116 of the bushing. Thus the fineness of the material emitted will be determined in a large measure by the elevational position of the grinder edge 114 along the bearing channel. If it is lowered further from the position in Figure 2, the material coming out will be increasingly coarse, whereas if it is raised from that position the material will be ground finer before being passed out. Accordingly, it will be seen that this can be readily regulated by axial adjustment of the whole central assembly consisting of grinder 108, disk 106, shaft 90, bearing member 76, operating lever 98 and cap nut 102; this adjustment being effected by screwing the bearing 76 in one direction or another so to raise or lower the assembly in relation to the top closure 14.

In such movement all the elements carried on the shaft 90 maintain their same relative position to the shaft and to the bearing. Consequently, the size to which material is being ground by the device can be changed at will and without dissembly of the parts or without affecting any quantity of unground material in the chamber. At the same time the unit is comparatively simple and economical in construction and, if required, can be quickly dissembled for cleaning or repair.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

The invention having been herein described, what I claim as new and desire to secure by Letters Patent is:

1. A grinding mill for grinding spices and the like comprising: a housing forming a supply chamber for spice to be ground; a grinding stator secured to the lower portion of said housing, said stator having a passage therethrough provided with a mouth portion and a discharge portion, said passage being circular in cross section with the walls of said passage being provided with grinding teeth; a shaft journalled in said housing, the axis of said shaft being disposed coaxially of said passage in said stator; a grinding rotor circular in cross section and provided with grinding teeth on its peripheral surface secured to said shaft in concentric relation thereto, said rotor being disposed within said stator passage with the walls of said passage through said stator and

the peripheral surface of said rotor forming between them a grinding chamber diminishing in cross-sectional area from the mouth portion toward the discharge portion of said passage; and a feeding disk having a diameter slightly less than the diameter of the mouth portion of said passage secured to said shaft above said rotor so as to be disposed immediately adjacent the mouth portion of said passage through said stator, said disk having at least one notch provided in the peripheral edge thereof to permit restricted flow of spice particles from said supply chamber to said grinding chamber but preventing substantial flow of spice particles and ground material in the opposite direction during the grinding operation.

2. A grinding mill as defined by claim 1 wherein said disk is provided with a pair of opposed notches in the peripheral edge thereof extending inwardly substantially halfway to said shaft on which said disk is secured.

3. A grinding mill for grinding spices and the like, comprising: a housing forming a supply chamber for spice to be ground; a grinding stator secured to the lower portion of said housing, said stator having a passage therethrough having a cylindrical portion, the walls of which are provided with grinding teeth, an outwardly flared mouth portion and a discharge portion; a shaft journalled in said housing, the axis of said shaft being disposed coaxially of said passage in said stator; a grinding rotor having a frustoconical upper portion provided with grinding teeth on its peripheral surface and a smooth-surfaced cylindrical lower portion, said rotor being secured to said shaft in concentric relation thereto and disposed within said stator passage with the walls of said passage through said stator and the peripheral surface of the upper portion of said rotor forming between them a grinding chamber diminishing in cross-sectional area from the mouth portion toward the discharge portion of said passage; a feeding disk having a diameter slightly less than the diameter of the mouth portion of said passage secured to said shaft above said rotor so as to be disposed immediately adjacent the mouth portion of said passage through said stator, said disk having a pair of opposed notches in the peripheral edge thereof to permit restricted flow of spice particles from said supply chamber to said grinding chamber but preventing substantial flow of spice particles and ground material in the opposite direction during the grinding operation; and means for effecting adjustable longitudinal movement of said shaft and grinding rotor secured thereto to vary the fineness of grinding, with said lower cylindrical portion of said rotor determining the maximum size of ground material discharged from said mill.

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