E. TWIGG.

GRINDING MILL.

APPLICATION FILED DEC. 18, 1913.

1,114,657.

Patented Oct. 20, 1914.

2 SHEETS—SHEET 1.

Fig. 1

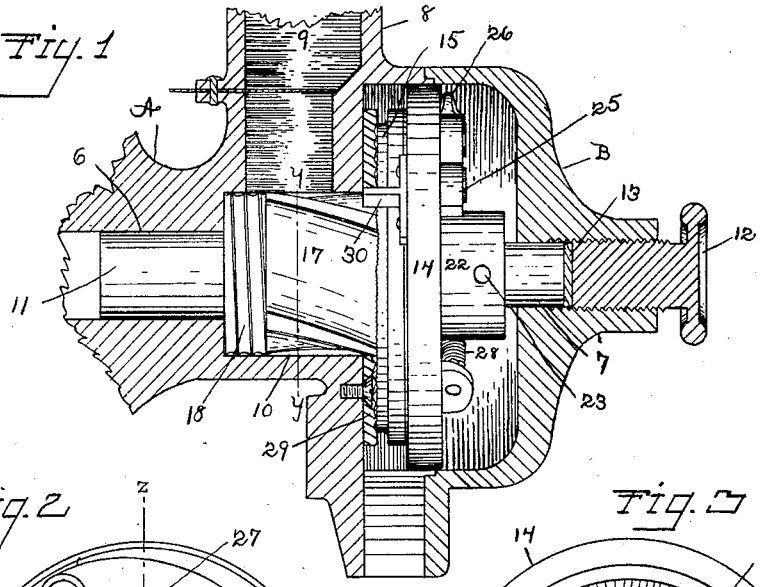


Fig. 2

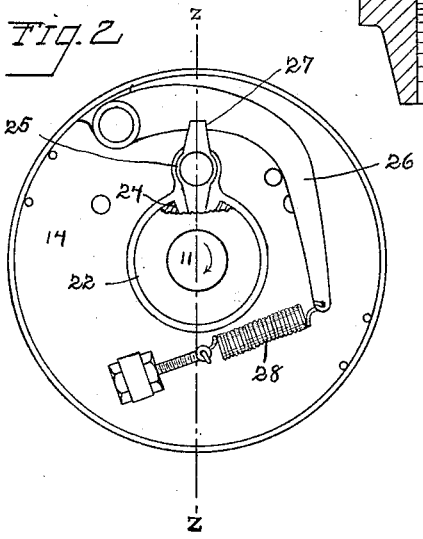
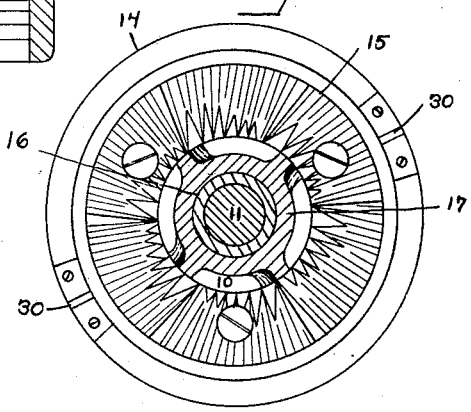


Fig. 3



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2 SHEETS—SHEET 2.

Fig. 4

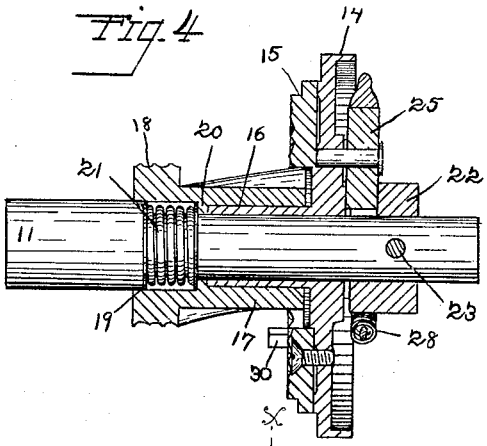
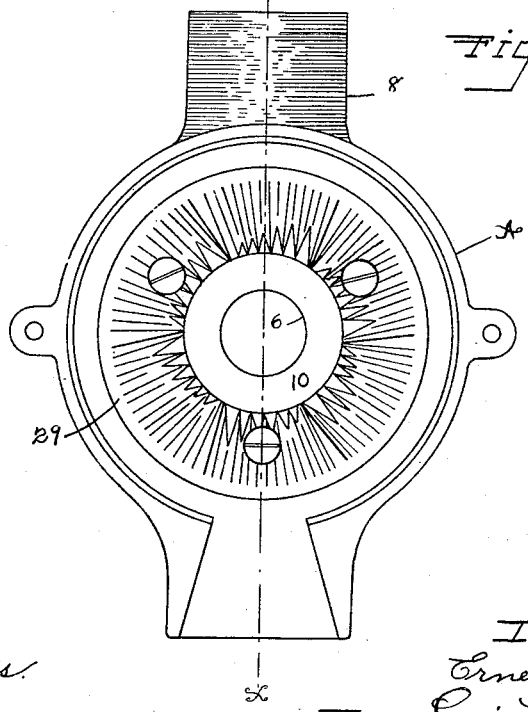


Fig. 5.



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UNITED STATES PATENT OFFICE.

ERNEST TWIGG, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO LANDERS, FRARY & CLARK, OF NEW BRITAIN, CONNECTICUT, A CORPORATION.

GRINDING-MILL.

1,114,657. Specification of Letters Patent. **Patented Oct. 20, 1914.**

Application filed December 18, 1913. Serial No. 807,450.

To all whom it may concern:

Be it known that I, ERNEST TWIGG, a citizen of the United States, residing at New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention relates to improvements in grinding mills and analogous machines, and the main object of my invention is to prevent foreign substances from being fed to the grinding disks.

In the accompanying drawing: Figure 1 is a vertical section of a portion of the mill case and the fixed grinding disk on the line *x x* of Fig. 5, in connection with an elevation of the parts inclosed therein. Fig. 2 is mainly an elevation of the back side of the plate that carries the moving disk together with a safety release device mounted thereon. Fig. 3 is a face view of the moving disk and plate, together with a transverse section of the shaft and feed worm on the line *y y* of Fig. 1. Fig. 4 is a sectional view of certain parts on the line *z z* of Fig. 2, together with a side elevation of the shaft and friction spring. Fig. 5 is a face view of the fixed disk and portion of the case on which it is mounted.

A designates the main portion of the case and B the cap or companion part for the same. The case is provided with a shaft bearing 6 and the cap with a shaft bearing 7. The neck 8 of the case A has a vertical feed passage 9 that leads to the enlarged feed chamber 10, the curved wall of which is concentric with the shaft bearings 6 and 7. The combined case and cap are also chambered out to receive the grinding disks and connected parts. The mill shaft 11 is supported by and revolves within the shaft bearings 6 and 7. An adjusting screw 12 is mounted in the cap in alinement with the shaft 11 and with some suitable antifriction washer 13 between the end of the shaft and screw. The shaft 11 carries a plate 14 on which the moving disk 15 is mounted in the usual manner, while the fixed disk 29 is mounted on the main part of the case. The plate 14 has formed thereon a tubular hub 16 that fits the shaft 11 and projects through both of the mill disks. The feed worm or screw 17 is provided with the usual wings or coarse threads for the main portion of its length, while at the end farthest from the disks is a shallow thread 18 of much less incline and depth. This shallow thread at its periphery is of a size to fit and fill the cylindrical wall of the feed chamber adjacent to the shaft bearing 6. Instead of making this feed worm integral with the disk carrying plate 14 I form it of a separate piece. The mill shaft is reduced in diameter at one end which is received in the bearing 7 thereby forming a shoulder 19. The feed worm 17 is bored through from end to end and provided with an internal flange 20 between its ends. The interior of this flange is bored to fit the reduced portion of the shaft 11 while the bore at the end nearest the plate 14 is of a size to receive and fit the tubular hub 16. The bore at the other end of the worm is of a size to receive and fit the larger diameter of the shaft 11 and a frictional spring 21, one end of which spring abuts the shoulder 19 and the other end abuts the flange 20. The spring is put under tension by endwise compression and the shaft is held in place longitudinally by means of a shouldered collar 22 that is secured thereto by means of a pin 23. The feed worm is free to rotate on the shaft 11 and hub 16, except for the friction due to the tension of the spring 21, which friction is sufficient to drive the feed worm with the shaft and moving disk in the normal action of the mill. I prefer to employ this separable feed worm frictionally driven, in connection with safety release devices of any suitable construction, as for example the safety release Patent No. 1,051,462 to Spellman and Twigg, dated Jan. 28, 1913. The shouldered collar 22 corresponds to the collar 7 of the said patent and it is notched at its end to form shoulders 24, the same as in the said patent. The plate 14 is loosely mounted on the shaft 11, and is provided with a turn button 25; one end of which is engaged by the shoulder 24 while the other end engages the inner side of a curved lever 26 adjacent to a shoulder 27 formed thereon, the said lever and button being normally held in position by the spring 28 all substantially as in the aforesaid patent. I prefer also to employ two

scrapers or arms 30 fixed on the broad side of the plate 14 near its edge and projecting across the disk chamber and extended closely to the wall thereof just outside the edge of the fixed disk 29.

Any suitable hopper or reservoir for the coffee or other material to be ground may be set in the neck 8 for supplying the mill in the usual manner. The force of the spring 21 within the feed worm should be such as to drive the feed worm normally and make it move with the plate 14 and moving disk 15, and also strong enough to drive the feed worm for breaking such portions of the material being ground that may be caught between the wings of the said worm and the wall of the feed passage 9 at its lower end. If however a stone, a piece of metal, or other foreign substance that is tougher or harder than the material being ground should be caught by a wing of the worm at the lower end of the feed passage, the feed worm will be stopped while the shaft and connected parts will continue to rotate. The stoppage of the feed worm will prevent any more material from being fed through the center of the fixed disk and then between the disks so that the mill will cease to deliver any material soon after the feed worm is stopped. The operator may then cut off the power and remove the obstruction that is preventing the said obstructing material from being fed into the space between the faces of the disks to damage them as they would be liable to be damaged in case such material was caught between their faces. When a safety release is employed the tension of the spring 21 should not be strong enough to trip the release. It is necessary to set the safety release so that considerable force is required to trip it, otherwise it will be liable to release the moving disk accidentally when there is no foreign substance within the disks. As a rule all pieces of foreign matter except very small pieces will be caught by the feed and thus prevent them from being fed to the faces of the disks. If however any hard pieces escape the feed worm and reach the disks the safety release will be tripped by forcing the lever 26 outwardly through the action of the shoulder 24 on the collar 22, the turn-button 25 and the shoulder 27 on the said lever, thereby partially rotating the turn button so as to permit the collar 22 and shaft 11 to rotate while the plate 14 and moving disk 15 will stop and prevent the said foreign substance from doing further damage to the mill disks. The shallow thread 18 on the feed worm will feed all fine particles away from the shaft bearing end of the feed worm and prevent it binding the parts. The scrapers or arms 30 on the plate 14 will keep the space surrounding the edges of the mill disks free from all material that otherwise might be compact therein so as to interfere with the efficiency of the mill.

It will be noted that the internal flange 20 of the feed worm 17 serves as an annular thrust bearing, being engaged on the one side by the end of the coil spring 21 and on the other side with the end of the tubular hub 16 of the plate 14, the same being inclosed by the body portion of the feed worm. These bearings are accordingly inclosed and finely ground particles are excluded therefrom on the one side, on the left as shown in Fig. 4, by the relatively fine thread 18 on the generally cylindrical periphery of the corresponding end of the feed worm 17, and on the other side by the fact that the free end of the worm is appreciably remote from the bearing flange 20 and that the intermediate portion of the worm is a fit for the tubular hub 16.

I claim as my invention:—

1. In a grinding mill, the combination of a case, a driving shaft in the said case, a fixed disk on the said case, a moving disk carried by the said shaft, a feed worm mounted on the said shaft separately from the said moving disk, the said moving disk having a tubular hub by which it is mounted on the said shaft, the said shaft having an enlargement forming a shoulder, the said feed worm having a bore that at one end fits over the said hub and at the other end fits over the said enlargement and having an internal annular flange intermediate the said ends and which is engaged on one side by the end of the said tubular hub, and a spring housed between the said feed worm and the said shaft and having the ends engaged with the said shoulder and flange.

2. In a grinding mill, a case having a vertical feed passage and a relatively enlarged feed chamber at the lower end thereof and having a bearing at one end of the said chamber, a shaft in the said bearing and extending through the said chamber, and a feed worm mounted on the said shaft, the said feed worm extending across the lower end of the said feed passage, and the said feed worm comprising a relatively coarse portion for the main portion that serves as the feed device proper and a portion adjacent the said bearing having a thread that is relatively fine and of small pitch suitable for engaging with relatively small sized particles and guiding the same away from the said bearing.

3. In a grinding mill having a case provided with a vertical feed passage and a feed chamber at the lower end thereof, and having a bearing at one end of the said chamber, a shaft in the said bearing and extending through the said chamber, a feed worm mounted on the said shaft and housed in the said chamber, the said feed worm com-

prising at the end remote from the said bearing a relatively coarse portion and at the end adjacent the said bearing a second portion having a relatively fine thread, and the said case having a recess adjacent the said bearing in which is housed an appreciable portion of the said second portion, and the walls of the said recess being a fit for the periphery of the said portion of the worm that is housed therein.

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