No. 863,067. PATENTED AUG. 13, 1907.

L. HOLLAND-LETZ.

GRINDING MILL.

APPLICATION FILED JULY 2, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

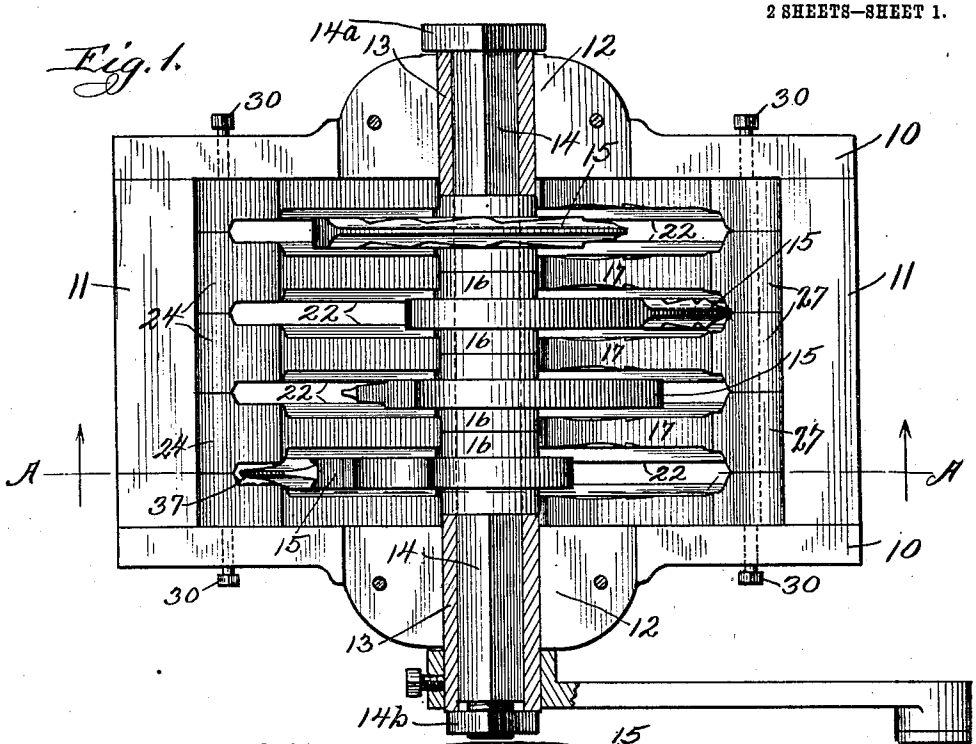
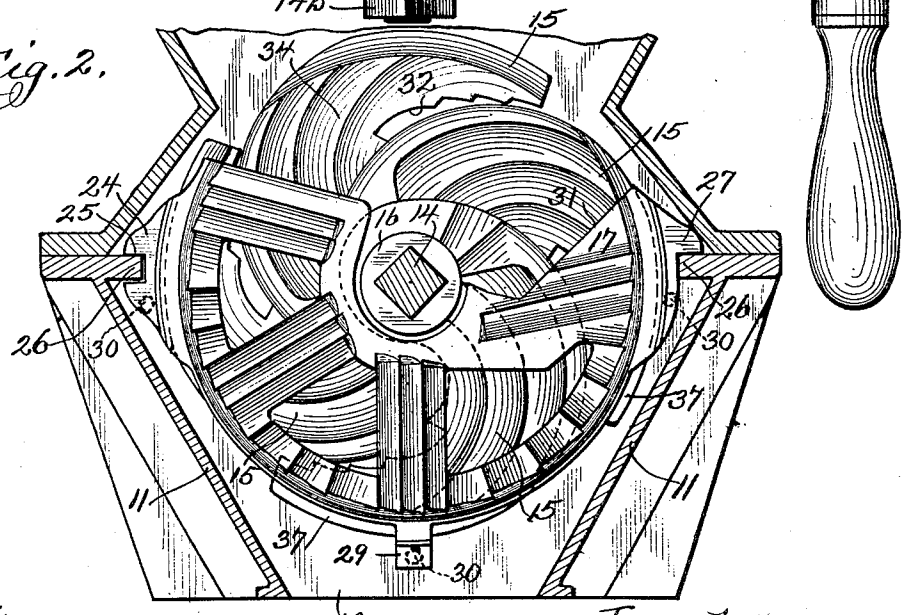


Fig. 2.



Witnesses:

R. J. Jacker

L. Merritt

Inventor:

Louis Holland-Letz,

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Fig. 3.

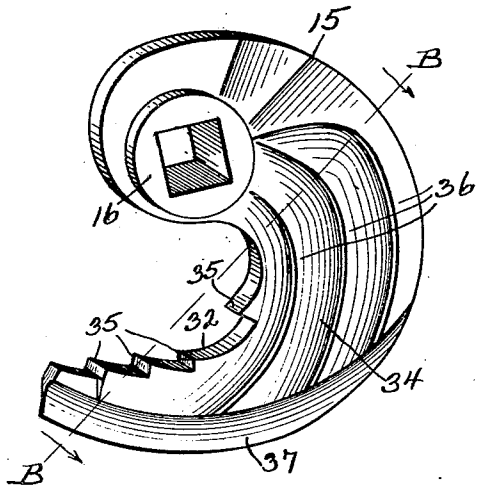


Fig. 4.

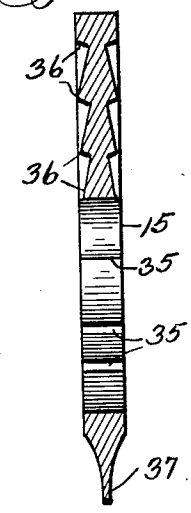


Fig. 5.

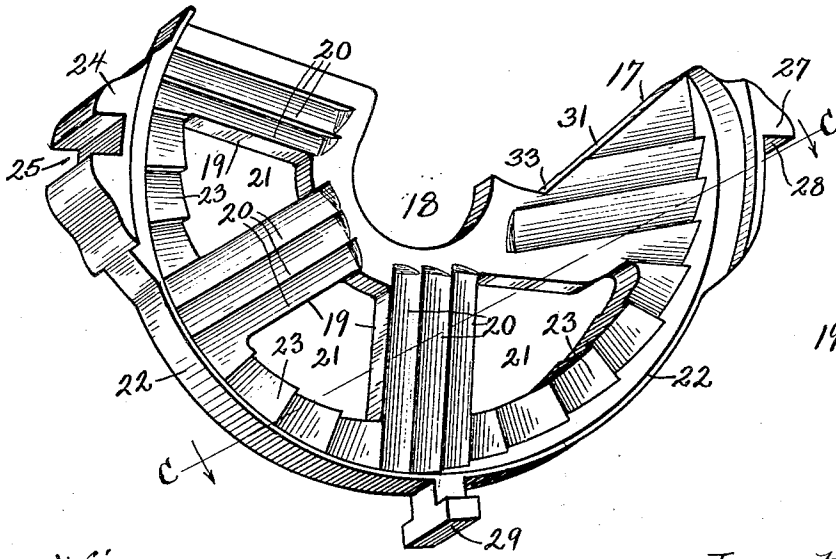
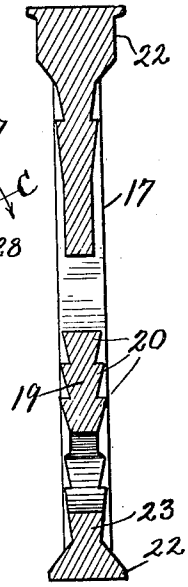


Fig. 6.



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L. Merritt

Inventor:
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By John Howard McElroy
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UNITED STATES PATENT OFFICE.

LOUIS HOLLAND-LETZ, OF CHICAGO, ILLINOIS.

GRINDING-MILL.

No. 863,067. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed July 2, 1906. Serial No. 324,311.

To all whom it may concern:

Be it known that I, LOUIS HOLLAND-LETZ, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention is designed to produce a simple and efficient mill of the class described, for general purposes, which shall be efficient in operation, durable and simple in its construction, which can be manufactured cheaply, and which can be constructed to any desired capacity by increasing the number of parts and the length of the machine.

To these ends, the machine consists essentially of a casing in which are mounted a plurality of stationary grinding plates having suitable roughened grinding surfaces between which rotate a corresponding plurality of moving plates or wings, preferably having their coöperating surfaces roughened, and mounted upon a common shaft extending longitudinally of the machine, and which is rotated by any suitable means.

To illustrate my invention, I annex hereto two sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which

Figure 1 is a top plan view of a small machine embodying my invention, with the upper half of the casing removed; Fig. 2 is a vertical section on the line A—A of Fig. 1; Fig. 3 is a perspective view of one of the rotating plates or wings; Fig. 4 is a section on the line B—B of Fig. 3; Fig. 5 is a perspective view of one of the stationary plates; and Fig. 6 is a section on the line C—C of Fig. 5.

The lower half of the casing preferably consists of the two end castings 10, which are preferably interchangeable and may be made from a single pattern, and the side castings 11, preferably similarly interchangeable and made from a single pattern, the four parts being suitably bolted or otherwise secured together. The end castings 10 are provided with the bearing boxes 12, in which rotate the bearing sleeves 13 secured on the ends of the shaft 14 and compelled to rotate therewith, preferably by reason of the angular cross section of the latter, it being in the present instance shown as square, in order to best accommodate the moving wings 15, which are spaced apart 90°, and provided with the hubs 16 having the squared apertures coöperating with the shaft so as to rotate therewith. Of course, it will be understood that if the wings 15 were spaced apart 120°, or 72°, or 60°, etc., the shaft would have a corresponding polygonal cross section of three or five, or six, etc., equal sides and angles.

I have illustrated the shaft as turned by a crank arm and handle, but it will be understood that it might be provided with a belt wheel to be driven by power, and also with a fly wheel, as is customary in this class of devices.

The stationary plates 17, as best seen in Fig. 5, are all alike, and each has a generally semi-circular outline with the recess 18 in the geometrical center to accommodate the hubs 16 of the wings 15 interposed between them. The sleeves 13, with the interposed hubs 16, are all clamped together to space the wings 15 apart the proper distance by means of its head 14^a of the shaft and the nut 14^b screwed on the threaded end thereof. The head 14^a and the hub of its crank arm or belt wheel or whatever is employed to rotate the shaft coöperating with the bearing boxes 12 may be used to position the shaft longitudinally. It will be understood, of course, that I may cast the wings upon the shaft, but prefer to build it up, as described. The corrugated or roughened grinding surface is preferably mainly composed of the spokes 19, which have the general radially or tangentially extending ribs 20, which are so shaped that the grinding surfaces are ratchet toothed in cross section, as will be seen from Fig. 6, with the teeth pointing in the direction from which the wing 15 approaches to coöperate therewith. These ribs 20 preferably project further at the back of the spoke than at the front, as seen in Fig. 6, the amount of the projection increasing uniformly from the front to the rear of the spokes. The recesses 21 between the spokes 19 preferably do not extend entirely to the widened rim 22, and the intervening surfaces 23 are similarly toothed or ribbed, as will be seen from Fig. 5. Each rim 22 carries on the side from which the coöperating wings 15 leave, the abutting lug 24 having the recess 25 adapted to fit over the supporting flange 26 on that side casting 11 projecting inwardly from the top of the casting for that purpose. The opposite side has the similarly positioned lug 27 which, for convenience of assembling the machine, is provided with a recess 28 which has but one engaging surface to rest upon the flange 26, as the thrust on this side of the machine is downward. Abutting lugs 29 are also provided at the bottom, and the plates 17 are held firmly together, but suitably spaced apart, by their abutting lugs 24, 27 and 29, by the bolts or screws 30 threaded through the end castings 10 and engaging the outermost of these lugs to clamp the plates together. The two end plates preferably have their outer surfaces plain so as to engage the end castings so as not to leave any spaces between them in which the material can gather. The edge 31 which coöperates with the generally concave advancing edge 32 of the wings 15, as seen in Figs. 2 and 5, has also a generally concave shape, owing to the reëntrant angle at 33, so that the material caught between these edges 31 and 32 is first broken up as these surfaces come together, and then

ground more finely between the corrugated surfaces of the plates 17 and the similarly corrugated surfaces 34 of the wings. The edges 32 are broken up into teeth 35, which, engaging the material one after the other serves to cut it up into sections, as it were, increasing the ease with which it is broken up. The ribs 36, making up the surfaces 34, resemble the ribs 20, except that they are preferably curved across the radial lines so that they present concave edges to the material which hold it to the center of the grinding surfaces and prevent its escaping prematurely and discharging before it is completely crushed.

As seen in Fig. 4, the ribs are shallower at the front than the rear edge, and increase in depth substantially uniformly so that the material is ground finer as the wings continue to advance.

As will be seen from Figs. 1, 2 and 3, the wings 15 have the peripheral flanges 37, which extend entirely along the forward crushing and grinding edge and surfaces of the wing, and closing the space between the ribs 22 prevent any possible escape of the material to be ground downward until it has passed entirely over the grinding surfaces of the wings and is allowed to discharge at the rear thereof. It will be noticed that the wings are arranged helically upon the shaft 14, being spaced apart in the present instance 90°, as before explained.

From the foregoing description of the construction and mode of operation of the specific parts of my improved mill, the mode of operation of the complete apparatus will be readily apparent and it will also be seen that I have produced a device of the class described which, while it is of a large capacity and uniformly efficient in operation, is, nevertheless, of extreme simplicity and durability in its construction and can be manufactured cheaply and of any desired capacity without any change except in its length and the number of its parts. It will also be apparent that it can be readily assembled and taken apart by unskilled mechanics, so that it can be readily cleaned, which is a factor of much importance where it is used to grind wet material, such as fruits, vegetables, fertilizers, etc.

While I have shown and described my invention as embodied in the form which is at present considered best adapted to carry out its purposes, it will be understood that it is capable of modifications and that I do not desire to be limited in the interpretation of the following claims, except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secured by Letters Patent of the United States is:

1. In a grinding mill, the combination with the parallel stationary segmental grinding plates each having the roughened grinding surfaces and the cutting edge directed toward the center, of the parallel rotating wings each having the roughened grinding surfaces and the toothed concave cutting edge intermeshing with the plates, the outer teeth coming into the plane of the plate cutting edges in advance of the inner teeth, and means for rotating the wings.

2. In a grinding mill, the combination with the parallel stationary segmental grinding plates each having the roughened grinding surfaces and the cutting edge directed toward the center, of the parallel rotating wings each having the roughened grinding surfaces and the toothed cutting edge intermeshing with the plates, the outer teeth coming into the plane of the plate cutting edges in advance of the inner teeth, the supporting shaft upon which the wings are set at different angles, and means for rotating said shaft.

3. In a grinding mill, the combination with the parallel stationary segmental grinding plates each having the roughened grinding surfaces and the cutting edge directed toward the center, of the parallel rotating wings each having the roughened grinding surfaces and the concave cutting edge intermeshing with the plates, and means for rotating the wings, said plates being apertured between their centers and the periphery to permit the passage of the material through the plates.

4. In a grinding mill, the combination with the parallel stationary segmental grinding plates each having the roughened grinding surfaces and the cutting edge directed toward the center, of the parallel rotating wings each having the roughened grinding surfaces and the toothed concave cutting edge intermeshing with the plates, the outer teeth coming into the plane of the plate cutting edges in advance of the inner teeth, and means for rotating the wings, said plates being apertured between their centers and the periphery to permit the passage of the material through the plates.

5. In a grinding mill, the combination with the parallel stationary segmental grinding plates each having the roughened grinding surfaces and the cutting edge directed toward the center, of the parallel rotating wings each having the roughened grinding surfaces and the toothed concave cutting edge intermeshing with the plates, the outer teeth coming into the plane of the plate cutting edges in advance of the inner teeth, the supporting shaft upon which the wings are set at different angles, and means for rotating said shaft, said plates being apertured between their centers and the periphery to permit the passage of the material through the plates.

6. In a grinding mill, the combination with the parallel stationary segmental grinding-plates each having the radial grinding ribs and the cutting edge directed toward the center, of the parallel rotating wings each having the toothed concave cutting edge and the grinding ribs on the sides concave in outline and substantially parallel to the cutting edge, the outer teeth of the concave cutting edge coming into the plane of the plate cutting edges in advance of the inner teeth, and means for rotating the wings.

7. In a grinding mill, the combination with the parallel stationary segmental grinding plates each having the radial grinding ribs and the cutting edge directed toward the center, of the parallel rotating wings each having the toothed concave cutting edge and the grinding ribs on the sides concave in outline and substantially parallel to the cutting edge, the outer teeth of the concave cutting edge coming into the plane of the plate cutting edges in advance of the inner teeth, the supporting shaft upon which the wings are set at different angles, and means for rotating the shaft.

8. In a grinding mill, the combination with the parallel stationary segmental grinding-plates each provided with the radial grinding ribs on its sides and the cutting edges directed toward the center, of the parallel rotating wings each provided with the toothed concave cutting edge and having the grinding ribs concave in outline, substantially parallel to the cutting edge and increasing in size from the forward edge to the rearward edge, and means for rotating the wings, the outer teeth of the concave cutting edge coming into the plane of the plate cutting edges in advance of the inner teeth.

9. In a grinding mill, the combination with the parallel stationary segmental grinding-plates each provided with the radial ribs and apertured between its center and the periphery to permit of the passage of the material through the plates, and having the cutting edge directed toward the center, of the parallel rotating wings each having the concave cutting edge and the grinding ribs concave in outline and substantially parallel to the cutting edge, and means for rotating the wings.

10. In a grinding mill, the combination with the parallel grinding plates having the roughened grinding surfaces and the wider rims at their peripheries, of the parallel rotating wings coöperating therewith and having the peripheral flanges extending between the rims of the ad-

jacent plates to prevent premature escape of the material.

11. In a grinding mill, the combination with the parallel grinding plates having the roughened surfaces and the wider rims at their peripheries, of the parallel hook shaped rotating wings having the peripheral flanges extending between the rims of the adjacent plates to compel the material to pass entirely across the wings before it can escape therefrom.

12. In a grinding mill, the combination with the parallel grinding plates having the roughened grinding surfaces and the wider rims, of the parallel hooked shaped rotating wings having the roughened grinding surfaces and the peripheral flange extending between the rims of the adjacent plates to compel the material to pass the entire extent of the grinding surfaces on the wings.

13. In a grinding mill, the combination with the parallel grinding plates having the roughened grinding surfaces and the wider rim at their peripheries, of the parallel rotating wings having the roughened grinding surfaces cooperating therewith and having the peripheral flanges extending between the rims of the adjacent plates, for the purpose described.

14. In a grinding mill, the combination with the casing having the inwardly projecting flanges, of the grinding plates extending through an angle of more than one hundred and eighty degrees and having the notches in one side to coöperate with both sides of the flange and the notches on the other side to coöperate with one side of its flange, and means for securing the plates in position in the casing.

15. In a grinding mill, the combination with the casing having the inwardly projecting flanges, of the grinding plates extending through an angle of more than one hundred and eighty degrees and having the notches in one side to coöperate with both sides of the flange and the notches on the other side to coöperate with one side of its flange, and means for securing the plates in position in the casing, consisting of the set screws threaded through the ends of the casing and engaging the outermost of the plates to clamp them all together.

16. In a grinding mill, the combination with the casing, of the grinding plates having the grinding surfaces and the wider rims at their peripheries and the still wider abutments outside of the rims adapted to engage each other and space the bodies of the plates apart a suitable distance, the set screws passed through the ends of the casing engaging the end plates and securing them together, and the parallel rotating wings having the peripheral flanges extending between the rims, substantially as and for the purpose described.

17. In a grinding mill, the combination with the casing having the inwardly projecting flanges, of the grinding plates having the roughened grinding surfaces and having the wider rims at their peripheries and the still wider abutments at their edges outside of the rims adapted to engage each other and space the bodies of the plates apart a suitable distance and having the notches in the abutments on one side to coöperate with both sides of the supporting flange on that side and the notches on the other side to coöperate with one side of the supporting flange on that side, the set screws passed through the ends of the casing engaging the end plates and securing them together, and the parallel hook shaped outer rotating wings coöperating therewith and having the peripheral flanges extending between the rims of the grinding plates, for the purpose described.

In witness whereof, I have hereunto set my hand and affixed my seal, this 27th day of June, 1906.

LOUIS HOLLAND-LETZ. [L. S.]

In the presence of—
JOHN H. MCELROY,
HAROLD G. BARRETT.