J. H. LETZ.

ROUGHAGE GRINDER.

APPLICATION FILED AUG. 14, 1917.

1,403,698.

Patented Jan. 17, 1922.

3 SHEETS—SHEET 1.

Fig. 1.

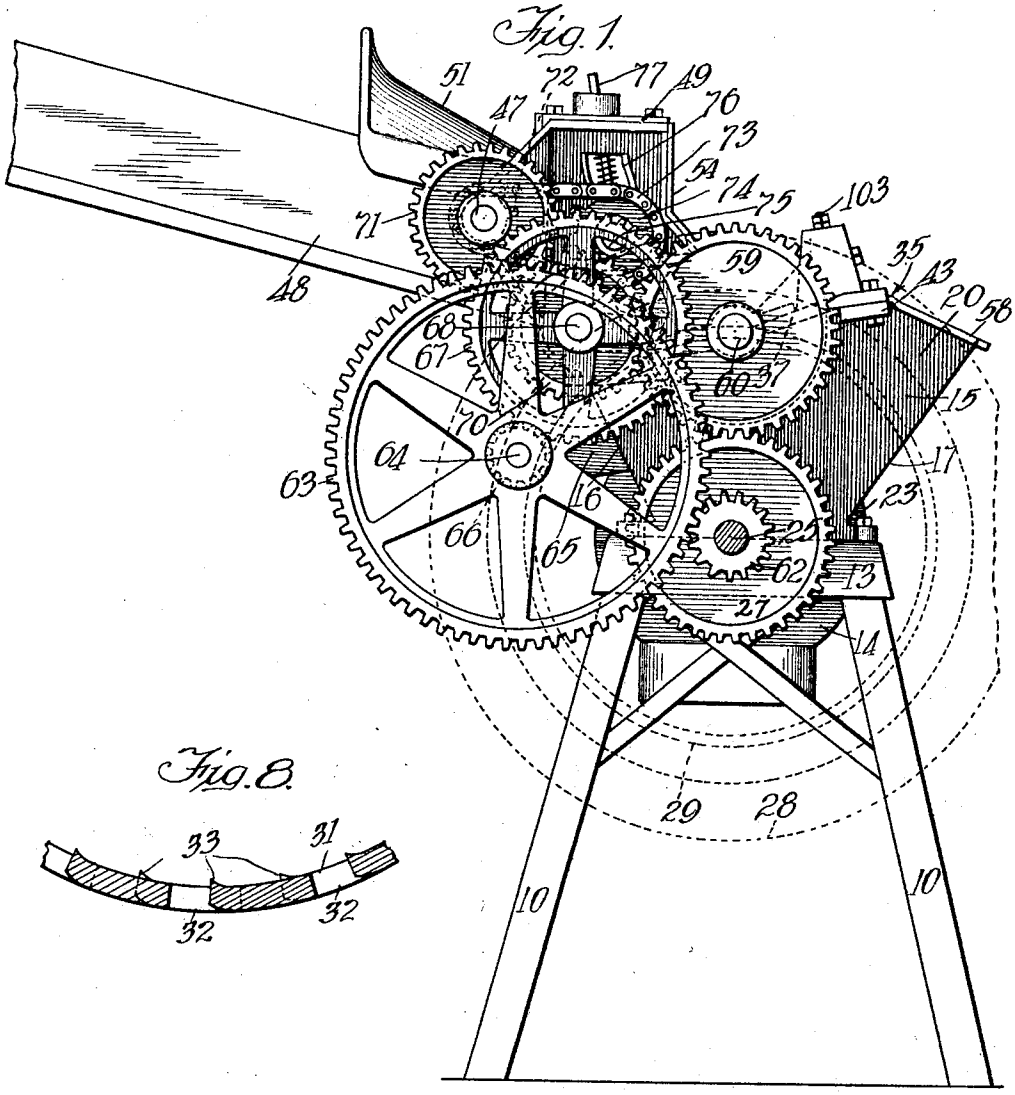
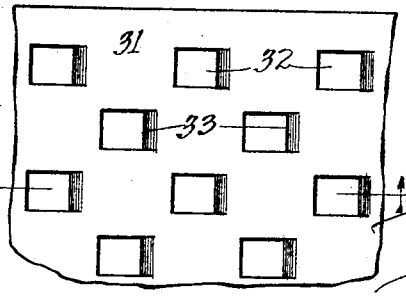



Fig. 8.




Fig. 7.




Witnesses:
W. F. Kilroy
Harry R. L. White

Inventor:
John H. Letz
By John Howard McElroy
his Atty.

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3 SHEETS—SHEET 2.

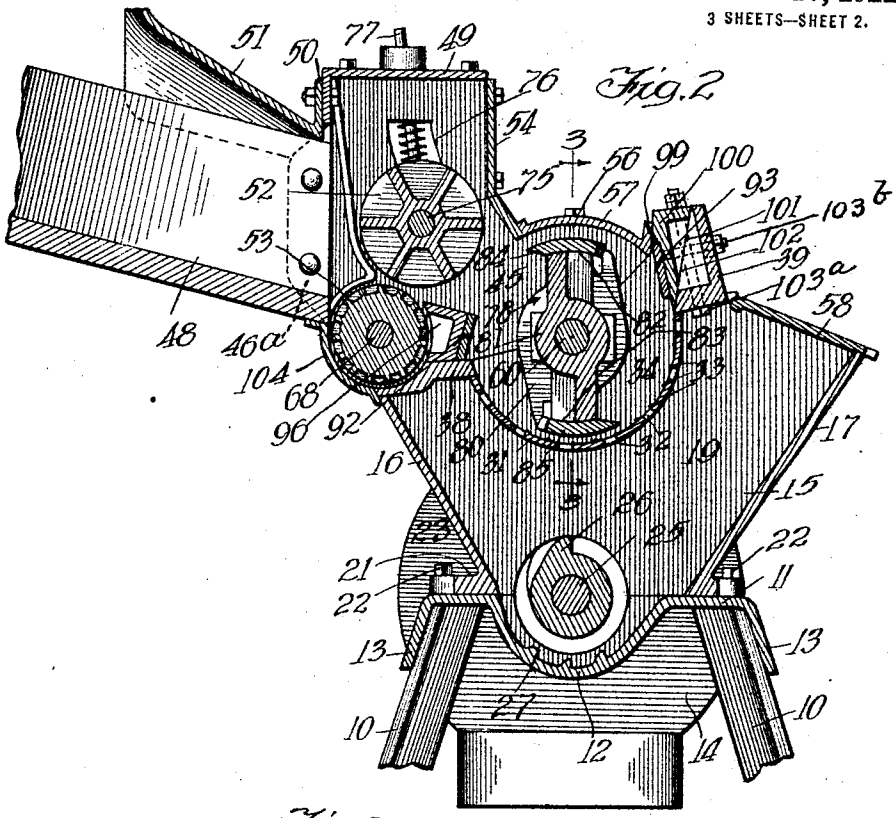


Fig. 2.

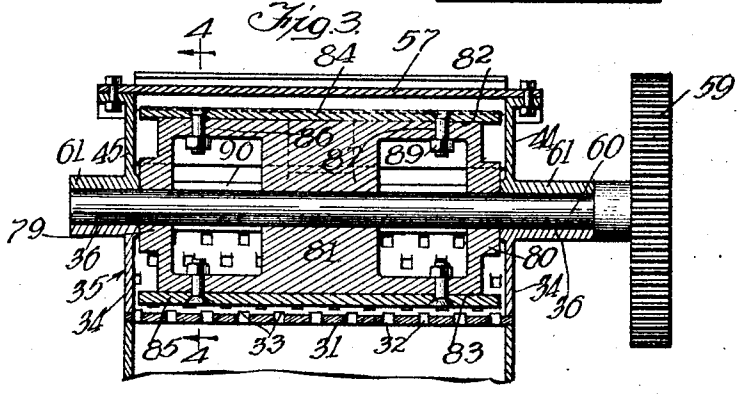


Fig. 3.

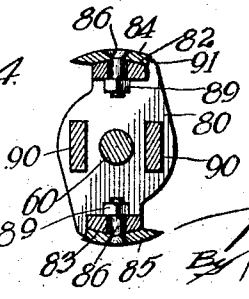


Fig. 4.

Witnesses:
W. H. Kilroy
Harry R. Lubliner

Inventor:
John H. Letz
By Johnston & McElroy
His Attys.

J. H. LETZ.

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3 SHEETS—SHEET 3.

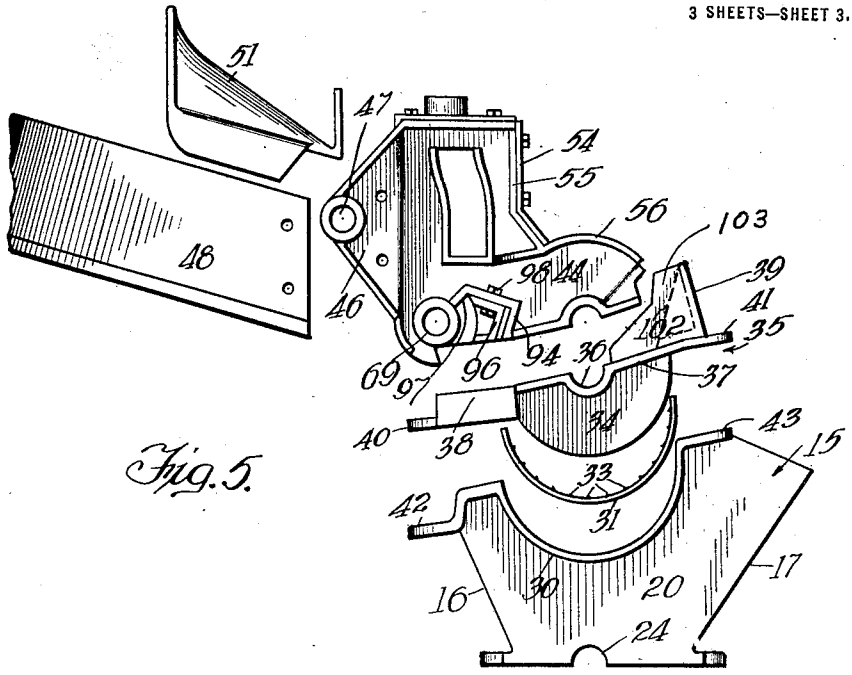
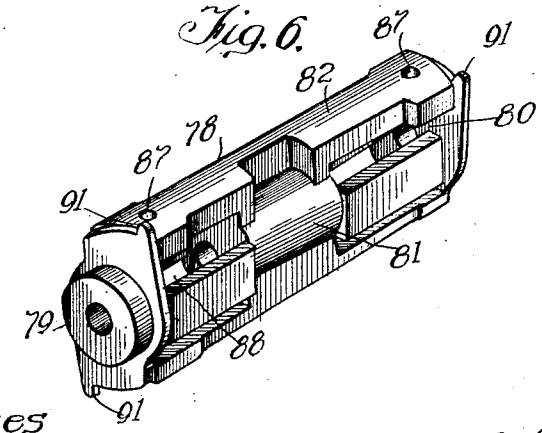



Fig. 5.

Fig. 6.




Witnesses
W. H. Kilroy
Harry R. C. White

Inventor:
John H. Letz
By John Howard McElroy,
his Atty.

# UNITED STATES PATENT OFFICE.

JOHN HOLLAND LETZ, OF CROWN POINT, INDIANA, ASSIGNOR TO THE LETZ MANUFACTURING COMPANY, OF CROWN POINT, INDIANA, A CORPORATION OF INDIANA.

## ROUGHAGE GRINDER.

1,403,698. Specification of Letters Patent. Patented Jan. 17, 1922.

Application filed August 14, 1917. Serial No. 186,091.

*To all whom it may concern:*

Be it known that I, JOHN HOLLAND LETZ, a citizen of the United States, and a resident of Crown Point, in the county of Lake and State of Indiana, have invented certain new and useful Improvements in Roughage Grinders, of which the following is a full, clear, and exact specification.

My invention is concerned with a new and useful roughage grinder for grinding jerked corn, corn on the ear, milo maize, Kaffir corn on the head, pea vine, or alfalfa hay, and roughage generally, and materials that cannot be ground without preliminary cutting, and it resides in a novel combination whereby such material can be fed into a hopper to the mechanism, which mechanism has a combined feeding and cutting action, so that it forces the material through the machine and at the same time cuts it into fine enough pieces, so that it is forced out, after being cut, through a screen plate, whence it falls into a grinder, which is set to grind the reduced pieces to any desired fineness, the preliminary cutting serving to reduce the material sufficiently so that the grinder will have a very great capacity.

My invention is further concerned with a novel cutting screen adapted to cooperate with shearing blades or cutter heads generally.

It is further concerned with a novel combination of frame elements, whereby with a few such elements I am able to produce a simple casing with the necessary bearings and housings that shall have the simplicity and rigidity necessary to enable it to stand up under the racking conditions of service without the parts loosening up or getting out of order.

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

Fig. 1 is a side elevation of the complete machine, but with the belt and fly wheels shown in dotted lines; Fig. 2 is a central vertical section; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is a side elevation of some of the parts going to make up the frame-work, said parts being slightly separated to show their construction; Fig. 6 is a perspective view of the casting constituting the basis of the cutter head; Fig. 7, Sheet 1, is a top plan view of a portion of the screen on an enlarged scale; and Fig. 8 is a vertical section through the same on the line 8—8 of Fig. 7.

In carrying out my invention in its preferred form, I mount the machine upon four legs 10, which are bolted or otherwise secured to the four corners of the grinder concave casting 11, which is generally rectangular in its horizontal outline and has the central longitudinally extending grinding concave portion 12 and the flange 13 extending around the sides and one end, the other end having secured thereto or formed therein the lower half 14 of the customary buhr casing. Bolted onto the top of the grinder concave casting 11 is the hopper casting 15, which has the converging sides 16 and 17 along the length of the machine, and the vertical parallel ends 19 and 20. The bottom of the casting is provided with the horizontal flange 21, which furnishes a support to rest on the horizontal portion of the grinder concave casting, and also to permit the passage of the bolts 22 there-through, by which the two castings are secured together. The end 19 of the casting 15 is provided with a large semi-circular recess opening into the upper portion 23 of the buhr casing, while its other end is provided with the semi-circular bearing recess 24, which cooperates with a similar bearing recess in the side of the grinder concave casting to form a bearing for that end of the main shaft 25, which has its other end journaled in the customary bearing in the buhr casing 14—23. The shaft 25 has secured thereon any desired form of a grinding cylinder 26, which cooperates with the grinding teeth or ribs 27, formed in the bottom of the grinder concave casting 11.

Outside of the casing, the shaft 25 has secured thereon the fly wheel 28 and the belt pulley 29, shown only in dotted lines in Fig. 1. The sides 19 and 20 of the hopper casting 15 have the semi-circular outwardly projecting flanges 30, on which rest the ends of the screen 31, which is preferably formed of a heavy sheet of steel, provided with preferably rectangular apertures 32 cut therein by dies, which dies are also preferably adjusted so that when the apertures are cut, one side 33 of each aperture will have some of the metal forced inward to

form a cutting edge. After the apertures 32 have been punched in the plate, it is bent into the semi-circular form shown and as shown in Fig. 7, these apertures are preferably staggered. The screen plate 31 is held in place by the semi-circular ends 34 of the intermediate casing casting 35, this casting being open in the center and of a general rectangular outline, it being provided at the center of the top of each of its ends with a half bearing 36 and the flanges 37. The two ends are connected by the side bars 38 and 39, seen in section in Fig. 2, and the sides 38 and 39 are provided with the ears 40 and 41, which cooperate with the ears 42 and 43 on the top of the hopper casting so that the two castings can be bolted together. Resting on the top of the ends of the intermediate casing casting 35 are a pair of end cover castings 44 and 45, which are symmetrical except that a portion of the projection $46^a$ on the casting 45 corresponding to the triangular projection 46 on the casting 44 is cut off. The part of the projection 46 corresponding to the cut-off portion of the projection $46^a$ is employed as a support for the stud shaft 47.

A feeding trough 48 has its sides bolted to the projections 46 and $46^a$ on the end cover castings 44 and 45. The tops of the castings 44 and 45 are connected by the top plate 49 bolted thereto, which has the downwardly projecting flange 50 on the front side thereof, to which is bolted the casting 51, which, cooperating with the top of the trough 48, upon which it rests, serves to form a sort of a hopper or feeding chute, through which the material is guided to the feed rolls 52 and 53. A substantially vertical side plate 54 is bolted to the rear edges of the castings 44 and 45, which are provided with the flanges 55, cooperating therewith. These castings are also provided with curved flanges 56, upon which rest and to which are bolted the curved cover plate 57. A cover plate 58, hinged to the rear of the top of the hopper casting 15, closes the rear portion thereof and gives access to the hopper of the grinding machine as distinguished from the cutting portion.

It will be noted that the feed roll 52 is provided with a series of rather large and deep pockets extending the length of the roll and that the roll 53 has a roughened periphery, preferably formed by longitudinal corrugations therein, and I find that the combination of the two differently shaped feed rolls having, however, substantially the same peripheral velocity is of much value in cutting certain kinds of material, such for instance as ear corn, which accommodates itself to the large pockets in the roll 52, and is thus readily fed through to the cutter head without unduly straining the springs pressing the rolls together.

The spur gear wheel 27 meshes with a similar spur gear wheel 59 secured on the adjacent end of the cutter head shaft 60, which is journaled in the suitable bearings formed by the semi-circular flanges 36 on the ends of the intermediate casing casting 35, and the cooperating semi-circular bearing flanges 61 formed on the adjacent ends of the castings 44 and 45. Also secured on the shaft 25 is the spur gear pinion 62, which meshes with a large spur gear wheel 63, journaled on the stud shaft 64, projecting outwardly from the bracket 65, secured to the adjacent portion of the hopper casting 15. This spur gear wheel 63 has on its hub a spur gear pinion 66 meshing with a spur gear wheel 67, secured on the shaft 68 of the lower feed roll 53, which shaft is journaled in the bearings 69 formed on the castings 44 and 45. This shaft 68 also has secured thereon, inside of the spur gear wheel 67, a smaller spur gear wheel 70, which meshes with the spur gear wheel 71 journaled on the stud shaft 47. This spur gear wheel 71 has secured on its hub the sprocket pinion 72, which through the sprocket chain 73 cooperating with the sprocket wheel 74 secured on the end of the shaft 75 of the upper feed roller 52, drives the latter and allows the movable bearings for the shaft 75 to rise and fall in the curved elongated bearing apertures 76, formed in the castings 44 and 45. Spring pressed plunger rods 77, extending down through apertures formed in the cover plate 49 and cooperating with the movable bearings of the shaft 75, keep the feed roller 52 in feeding engagement with the companion roller 53, while permitting it to rise and fall as much as may be necessary during the feeding operation.

The basis of the cutter head is the casting 78 seen in perspective in Fig. 6, and which may be said to consist of the end pieces 79 and 80 and the central piece 81, all three of said pieces having the aligned central aperture to accommodate the shaft 60, upon which the casting 78 is secured. The casting also has the pair of opposed preferably curved and helically arranged bearing surfaces 82 and 83, upon which are secured the correspondingly shaped cutting knives 84 and 85, which are secured thereto by the bolts 86, having their heads let into the upper surfaces of the blades and their bodies extending through the apertures 87 formed in the surfaces 88. The casting 78 is provided with the recesses 88 therein, so that the nuts 89 may be screwed in place, but these recesses are partly closed by the connecting bars 90, so that the cutter head may have the forced feeding action hereinafter noted. The ends 79 and 80 are provided with the projections 91, against which the rear side of the knives 84 and 85 rests,

so as to accurately position them. It will be noted that the cutting edges of these knives are opposed to the stationary cutting edges 33, formed on the sides of the apertures 32, and further shearing action of the material fed between the rolls 52 and 53 is secured by providing another pair of stationary cutter bars 92 and 93. The cutter bar 92 is secured between the flanges 94, formed on the end castings 44 and 45, and the backing bar 96, which has the shape, in cross section, shown in Fig. 2 and which fits in correspondingly shaped recesses 97, formed in the castings 44 and 45, being connected thereto by the bolts 98. The cutter bar 93 is adjustable to and from the path of the knives 84 and 85 by being secured against the shoulder 99 formed on the face of the angular bar 100, which has a pair of inclined faces 101 at its ends, cooperating with a correspondingly inclined pair of faces 102, formed on the interior of the flanges 103, projecting upward from the rear ends of intermediate casing casting 35. The cutter bar 93 is secured in place, after it has been adjusted, by the bolts $103^b$ having their heads countersunk therein and passing through apertures in the bar 100 and through slotted apertures in the connecting rib 39. The rib 39 and the bar 100 are also further secured together, after being adjusted, by the substantially vertical bolts $103^a$ passing through suitable apertures therein. The space between the trough 48 and the side 16 of the hopper casting is closed by the curved plate 104 suitably bolted in place.

With the structure described, it will be obvious that material placed in the trough 48 will be carried by the feed rollers 52 and 53 over the cutter bar 92, where it is acted on by the knives 84 and 85. It is also acted on by said knives cooperating with the cutting edges 33, and, when fine enough, passes through the apertures 32. It is also caught between the cutter bar 93 and the blades 84 and 85, and the substantially solid casting 78 connecting the knives 84 and 85 carries the materials around and around past the knives 92 and 93 and the cutting edges 33, by a forced feeding action, until it is cut fine enough so that it passes through the apertures 32, whence it falls into the grinder proper and is of a sufficient fineness so that it can be treated by said grinder proper and reduced to the desired form.

While I have shown and described my invention embodied in the form which I consider best adapted to carry out its purpose, it will be understood that it is capable of moifications and that I do not desire it 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 secure by Letters Patent of the United States, is:

1. In a device of the class described, the combination with a horizontal grinder concave casting, of a hopper casting resting and secured thereon, said two castings having a horizontal shaft bearing at their line of junction and said hopper casting having semi-circular bearing flanges at the top of its ends, an arcuate screen plate resting on said flanges, an intermediate casing casting having semi-circular ends resting in and on the ends of the screen plate, and a pair of end cover castings resting on and secured to the intermediate casing casting, said last three castings having a horizontal shaft bearing at their line of junction.

2. In a device of the class described, the combination with a horizontal grinder concave casting, of a hopper casting resting and secured thereon, said two castings having a horizontal shaft bearing at their line of junction and said hopper casting having semi-circular bearing flanges at the top of its ends, an arcuate screen plate resting on said flanges, an intermediate casing casting having semi-circular ends resting in and on the ends of the screen plate, and a pair of end cover castings resting on and secured to the main end casting, said last three castings having a horizontal shaft bearing at their line of junction, and said end cover castings having opposed bearings for another horizontal shaft and opposed elongated slots for vertically movable shaft bearings.

3. In a device of the class described, the combination with a hopper casting, having semi-circular bearing flanges at the top of its ends, of an arcuate screen plate resting on said flanges, an intermediate casing casting having semi-circular ends resting in and on the ends of the screen plate, and a pair of end cover castings resting on and secured to the intermediate casing casting, substantially as shown and described.

In witness whereof, I have hereunto set my hand and affixed my seal, this 8th day of August, A. D. 1917.

JOHN HOLLAND LETZ [L. S.]

Witness:

JOHN C. FRAAS.