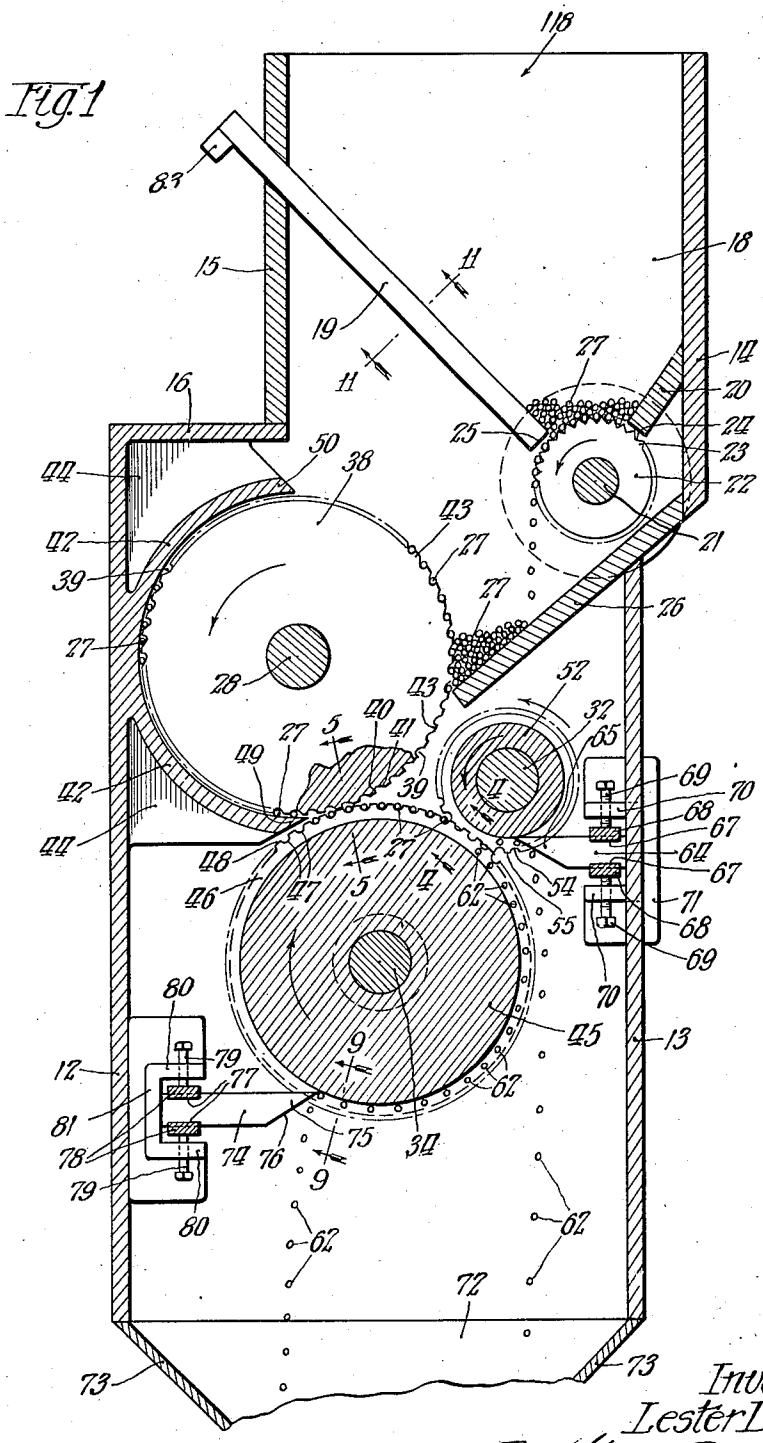
May 18, 1926. 1,584,869

L. L. LADD

GRAIN CUTTING APPARATUS

Filed June 21, 1923 5 Sheets-Sheet 1

Fig. 1



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By Wm. W. Zabel Atty.

May 18, 1926. 1,584,869

L. L. LADD

GRAIN CUTTING APPARATUS

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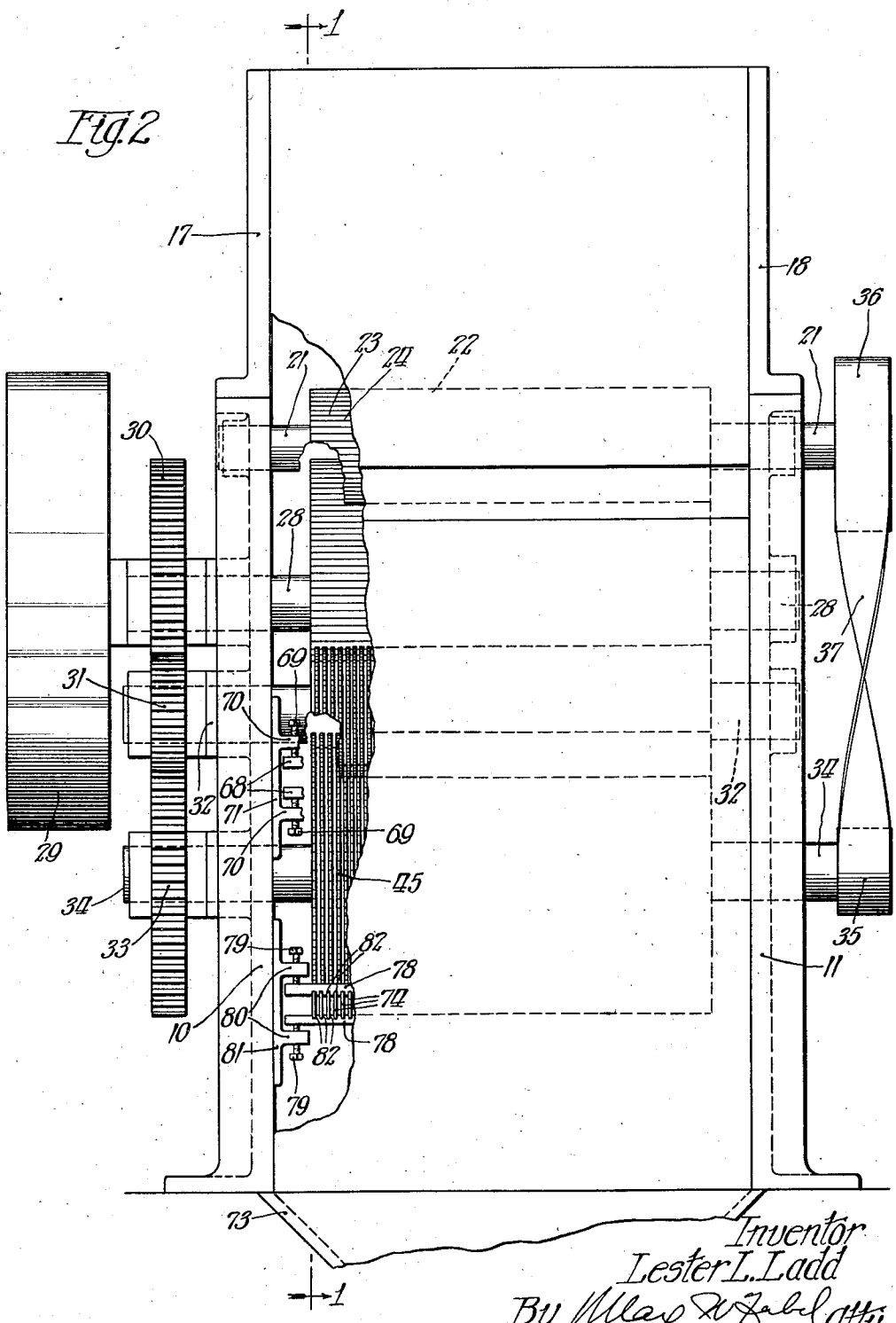
Fig. 2



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May 18, 1926. 1,584,869

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GRAIN CUTTING APPARATUS

Filed June 21, 1923 5 Sheets-Sheet 3

Fig. 3

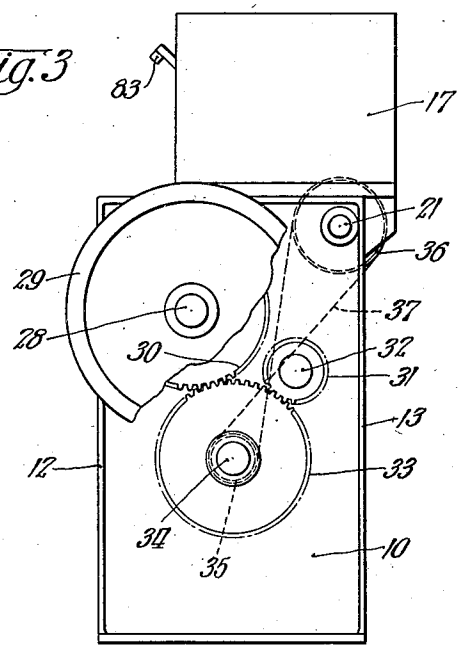


Fig. 4

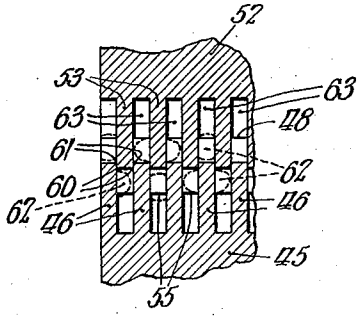


Fig. 5

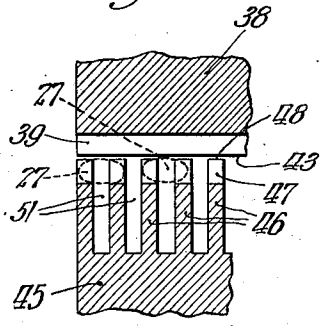


Fig. 7

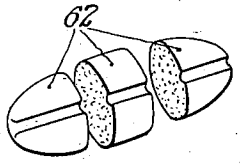
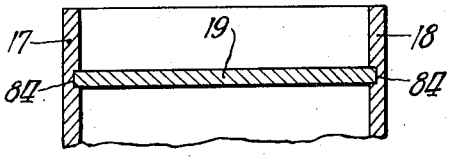


Fig. 11



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May 18, 1926. 1,584,869

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GRAIN CUTTING APPARATUS

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Fig. 6

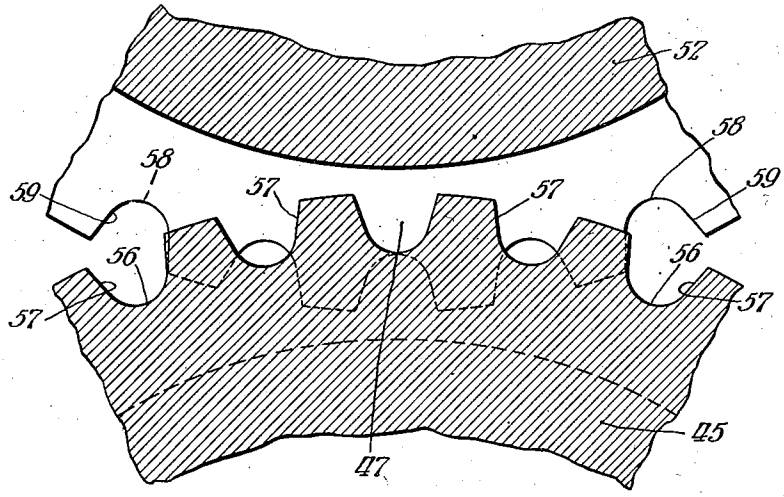


Fig. 8

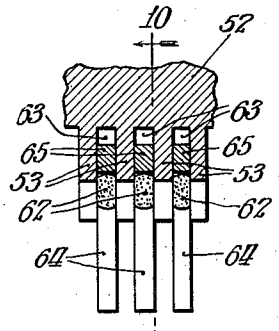


Fig. 10

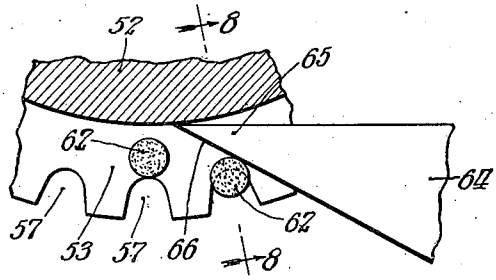
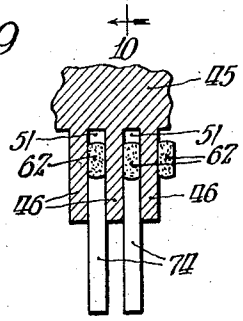


Fig. 9



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May 18, 1926. 1,584,869

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GRAIN CUTTING APPARATUS

Filed June 21, 1923 5 Sheets-Sheet 5

Fig. 12

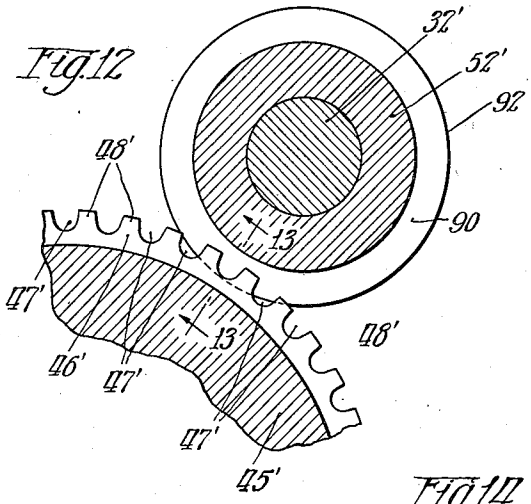


Fig. 13

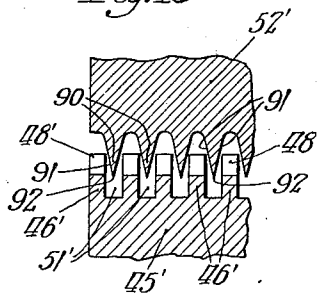


Fig. 14

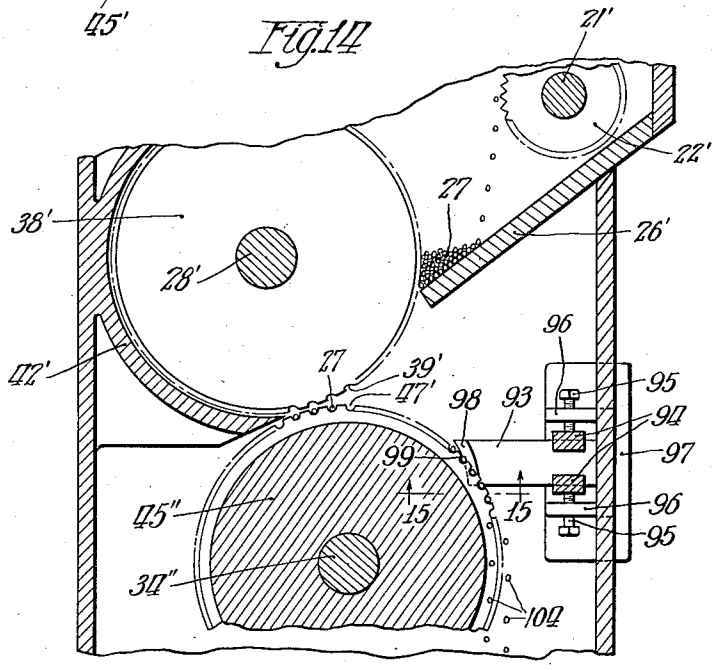


Fig. 15

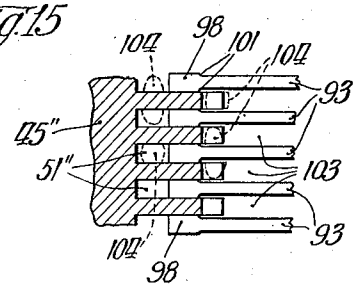
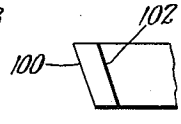


Fig. 16



Inventor
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Patented May 18, 1926. 1,584,869

UNITED STATES PATENT OFFICE.

LESTER L. LADD, OF LOCKPORT, ILLINOIS.

GRAIN-CUTTING APPARATUS.

Application filed June 21, 1923. Serial No. 646,875.

My invention relates to grain cutters and more particularly to means for cutting grains transversely into a plurality of parts.

In grain cutting machinery now in use it has been found very difficult to cut the grains into pieces of substantially the same size. The apparatus now used most commonly comprises a plurality of reciprocating knives or blades and means for holding the grain in the path of the blades, the same cutter cutting successive pieces off of the same piece of grain. By this method of cutting grain many grains are not cut at all, others only once, still others a plurality of times into the desired number of pieces, while other grains are cut so as to be practically powdered, which is very undesirable. In order to cut the grain properly for the uses for which cut grain is intended, the resulting particles should be of substantially the same size and it is the purpose of my invention to provide means for cutting grain producing a product that is of substantially uniform size with substantially no whole grains and a minimum of dust or powdered grain.

It is particularly desirable that the grain be cut into equal sizes, in making chicken feed for baby chickens, or what is commonly known as baby chick feed, and also for preparing oats for rolling in making what is known as "quick" oats, which is rolled oats that can be cooked more quickly than the ordinary kind. This quality of the rolled oats is obtained by cutting the shelled grains of oats into substantially an equal number of parts, the machine shown cutting the grain into three parts ordinarily. These cut grains are then rolled in the same manner that the whole grains are rolled in ordinary rolled oats, producing a product which is made up of smaller flakes than the ordinary rolled oats and which cooks more quickly. The machine is particularly adapted for cutting grains used for the two purposes mentioned above which are of an elongated form such as wheat or oats, and it has been found that rotary cutting means can be used very effectively with this sort of a grain to produce the desired cutting into an equal number of parts.

In the form of the invention illustrated, the grain is cut between a pair of rotary cutting members comprising a plurality of cooperating cutting teeth which intermesh and which gradually cut the grain through from all sides as the rotary cutting members move into cutting relationship. Means is also preferably provided for properly positioning the grains relative to the rotary cutting members. In order to properly cut the grains into a substantially equal number of parts of substantially the same size, it is necessary that the grains be properly placed in position relative to the cutting members and rotary means is provided for arranging the grains properly to be received on the cutting means. Said positioning means preferably comprises a rotary drum-like member having a surface provided with axially extending grooves or pockets therein for receiving the grains. When the grains are received in said pockets all of the same will extend in rows in substantially axial alignment. In order to insure substantially even distribution of the grains over the surface of the drum, spreading means, having axially extending pockets therein, is provided between said positioning drum and a hopper in which the grain that is to be cut is placed in feeding the machine. From the positioning drum, or rotary feeding member, the grains are transferred to one of the cutting rolls or rotary cutters, which carries the grains into position to be cut between said cutter and the co-operating rotary cutter.

Said rotary cutters are preferably provided with a plurality of circumferentially extending ribs, said ribs being provided with toothed surfaces providing pockets between the teeth in which the grains are received. The ribs on one of the rotary cutting members fit between the ribs on the other rotary cutting member and the pockets, or recesses, in the ribs are preferably so arranged that when the cutting members move into cutting relationship, said grooves or recesses will provide a gradually narrowing opening for the grain so that the grain will be gradually cut from the outer surface thereof inwardly on all sides so as to cleanly cut the same into the desired number of parts.

The cut grain will ordinarily be forced into the grooves between the teeth on the rotary cutting members and it is preferred that means be provided for dislodging said cut grain from said grooves or recesses, the means shown comprising stationary dislodging members or plates projecting into the grooves so as to pry the said cut pieces of

grain out of the grooves with a sort of wedging action.

Instead of providing grooved rotary cutting members which have transverse recesses arranged in rows therein, one of said rotary cutters may, if desired, be provided with a plurality of circumferentially extending cutting blades or ribs which co-operate with the rotary cutter having the transversely extending recesses. The rotary cutter member that has no transversely extending recesses can not, of course, carry the grain from the feeding device and, accordingly, the rotary cutter with the continuous circumferentially extending cutting blades must take the place of the second rotary cutter member described above.

Instead of providing a second or co-operating cutter member which rotates, a stationary cutter member may be provided which is so constructed that the cut grain will be forced to a position to fall through the same by the rotary cutter member co-operating therewith, thus preventing clogging of the stationary cutter.

Other objects and advantages of the invention will appear as the description of the accompanying drawings proceeds. However, I desire to have it distinctly understood that I do not intend to limit myself to the exact details shown or described but that I intend to include as part of my invention all such obvious changes and modifications of parts as would occur to a person skilled in this art and as would fall within the scope of the claims.

In the drawings:

Fig. 1 is a view in vertical section of my improved grain cutting apparatus, certain portions thereof being broken away to more clearly show the operation of the device;

Fig. 2 is a front elevation of my machine, a portion thereof being broken away to reveal the interior thereof;

Fig. 3 is a side elevation of my machine, partly broken away more clearly to show the driving connections thereof;

Fig. 4 is a fragmentary enlarged sectional view taken on a line 4—4 of Fig. 1;

Fig. 5 is a similar section taken on a line 5—5 of Fig. 1;

Fig. 6 is a fragmentary enlarged sectional view of portions of the two rotary cutters at the point where cutting takes place;

Fig. 7 is a perspective view greatly magnified of a grain of oats, showing the same cut into a plurality of parts in the manner in which the same would be cut by my grain cutting machine;

Fig. 8 is a fragmentary enlarged sectional view of one of the cutters taken on the line 8—8 of Fig. 10;

Fig. 9 is a similar sectional view taken on a line 9—9 of Fig. 1;

Fig. 10 is an enlarged sectional view taken on a line 10—10 of Fig. 8.

Fig. 11 is a section taken on the line 11—11 of Fig. 1, showing the guiding means for the adjustable slide for regulating the feeding of the grain;

Fig. 12 is a fragmentary detailed sectional view of a modified form of cutting apparatus using a rotary cutter having beveled cutting edges;

Fig. 13 is a section thereof taken on a line 13—13 of Fig. 12;

Fig. 14 is a fragmentary vertical sectional view of a portion of a grain cutting apparatus using a stationary cutter member co-operating with a rotary cutter member;

Fig. 15 is a section taken on a line 15—15 of Fig. 14; and

Fig. 16 is a fragmentary side elevational view of a slightly modified cutter member to be used in a device such as that shown in Fig. 14.

Referring in detail to the drawings, my improved grain cutting device comprises a pair of side members 10 and 11, forming the side walls of the machine, a front wall 12 and a rear wall 13. Above the wall 13 is provided an off-set wall portion 14 and above the wall 12 is provided an off-set wall portion 15 joined to the wall 12 by means of a horizontally extending portion 16. The wall portions 14 and 15 and the side walls 17 and 18, extending upwardly from the walls 10 and 11 respectively, form a hopper 118 into which the grain that is to be cut is emptied. Within the hopper 118 is provided an inclined portion 19 and an inclined portion 20, said portions 19 and 20 providing a gradually narrowing hopper bottom for feeding the grain toward the opening existing between the members 19 and 20 at the lower ends thereof.

Mounted in bearings in the side members 10 and 11 is the shaft 21 upon which is mounted the rotary feeding and spreading member 22, said member 22 being mounted to rotate with the shaft 21. The member 22 is provided with a plurality of axially extending ribs or teeth 23 on the surface thereof, providing axially extending grooves 24 therebetween. It will be noted that the member 21 projects into the hopper 118 between the members 19 and 20 so that the grain will drop into the pockets or grooves 24 and rest therein, the spacing between the lower edge 25 of the member 19 and outer ends of the ribs or teeth 23, being such that grains that are not in the grooves will not pass out of the hopper 118.

The feeding roll 22 rotates in the direction indicated by the arrow placed thereon and it will be seen that the grain will be carried outwardly under the edge 25 of the member 19 away from the hopper 118 and

that the same will drop onto the inclined partition 26 as clearly indicated in Fig. 1. The grain is indicated in this figure by the numeral 27.

The main driving shaft of the machine is indicated by the numeral 28 and in Fig. 2 a pulley 29 is shown as being mounted on the outer end of said shaft 28 for rotating the same. A gear 30 is keyed on said shaft 28 and said gear 30 meshes with gear 33 keyed on the shaft 34 which is mounted in bearings in the members 10 and 11, as will be clear from Fig. 2. The gear 33 meshes in turn with the gear 31 keyed on the shaft 32 which is also mounted in bearings in the side members 10 and 11, said shaft 34 being provided with a pulley 35 on the end thereof opposite that carrying the gear 33. The shaft 21 is also provided with a pulley indicated by the numeral 36 and said pulley 36 is driven from the main drive shaft 28 through the gears 30 and 33 by means of the crossed belt 37 passing over said pulleys 35 and 36.

On the main drive shaft 28 is mounted, to rotate therewith, a rotary feeding member 38. The rotary feeding member 38 is provided with a plurality of grooves therein indicated by the numeral 39, said grooves extending axially of the outer surface of said feeding drum 38. The grooves 39 are provided with curved wall portions 40 which merge into inclined wall portions 41, thus providing pockets into which the individual grains 27 can easily pass when the member 38 is rotated in the direction of the arrow thereon in Fig. 1. The grooves 39 will pick up the grains 27 from the layer thereof that collects at the lower end of the inclined member 26 and these will be carried around on said member 38. A curved guard member 42 is provided closely adjacent the surface of the member 38, said member 42 being spaced sufficiently for the ribs, on the raised portions 43, between the grooves 39, to pass by the same, but said guard 42 is not spaced so far from the surface of the member 38 that the grains 27 can fall out of the pockets 39 after the same have passed the highest point of their travel around the shaft 28. The guard member 42 is shown as being integral with the front plate 12 but it is immaterial how the same is mounted as long as it is held rigidly in properly spaced relationship to the member 38. The guard member 42 is substantially cylindrical on the face thereof adjacent the member 38 and is provided with strengthening ribs 44.

On the shaft 34 is mounted a rotary grain cutting member 45. The member 45, as will be seen from Figs. 4 and 5, is provided with a plurality of circumferentially extending ribs 46. The ribs 46 are provided with recesses 47 provided with teeth 48 between the same. The recesses 47 on adjacent ribs 46 are in axial alignment. Thus all of the recesses 47 are in axial rows forming grooves in the surface of the member 45, said grooves being arranged in the same circumferentially spaced relationship as the grooves 39 on the member 38. As the shafts 28 and 34 are geared together through the gears 30 and 33 and as the number of teeth on the gears 30 and 33 are in the same proportion as the number of axially extending grooves in the members 38 and 45 respectively, it is evident that the grooves 39 and the grooves formed by the recesses 47 will be in alignment where said members 38 and 45 approach each other. Thus the grains 27 will be transferred from the grooves or pockets in the member 38 to the longitudinally extending grooves or pockets in the cutter member 45. In order to prevent any of the grains 27 from falling off of the member 38, without being transferred to the cutter member 45, the guard member 42 is provided with a tapering lip portion 49 which extends nearly to the point of adjacency of the members 38 and 45. The member 42 also serves the function of preventing any whole grains from passing through the machine without having entered one of the pockets or grooves 39, due to the fact that a tapering or wedge-like end portion 50 is provided thereon at the end thereof nearest the hopper 118. The wedge-like end member 50, it will be seen, will tend to throw any grains that are not resting properly in the grooves 39, out of the same and back into the space above the inclined member 26.

The grains 27, after having been transferred from the member 38, will rest in the recesses 47 in substantially the manner shown in Fig. 5, from which figure it will be evident that each grain will rest on one or more of said circumferentially extending ribs 46 in the grooves 47 provided in said ribs, and that each of said grains will extend across one or more of the grooves 51 provided between the members 46. The grains 27 will remain in this position on the member 45 and will be carried with said member 45 as the same rotates in the direction of the arrow thereon in Fig. 1.

On the shaft 32 is mounted, to rotate therewith, the cutter member 52 which cooperates with the rotary cutting member 45 to cut the grain. The member 52 is provided with a plurality of circumferentially extending ribs 53 similar to the ribs 46. As will be seen from Fig. 4, the ribs 53 extend between the ribs 46 so that said members 45 and 52 have interfitting circumferentially extending rib portions. The ribs 53 are provided with recesses 54, similar to the recesses 47, which are also arranged in axially extending rows on the adjacent ribs 53, thus providing teeth 55 on the member

52 corresponding to the teeth 48 on the member 45. It will be noted that the walls of the recesses 47 have an arcuate portion 56 merging into inclined portions 57 which extend to the outer periphery of the member 45. Similarly, the walls of the recesses 54 are provided with arcuate portions 58 and inclined portions 59 extending to the outer periphery of the member 52. It will also be noted from Fig. 4 that the edges of the ribs 46 and 53, at the corners adjacent the recesses, are substantially right-angular, thus providing a sharp cutting edge, said edges being indicated, respectively in Fig. 4, by the numerals 60 and 61.

The shafts 32 and 34 are geared together by means of the gears 31 and 33 and as the number of recesses in each rib in both the members 45 and 52 corresponds to the number of teeth on the gears 33 and 31 respectively, it will be seen that a recess 47 will always be opposite a recess 54 where the members 45 and 52 intermesh. The grain, being in the pockets or recesses 47, will be engaged by the corners of the ribs 46 and ribs 53 adjacent the recesses 47 and 54 as said members 52 and 45 begin to interengage, and the spacing of the parts and the proportion thereof is such that as the members 45 and 52 rotate in the directions indicated by the arrows in Fig. 1, the space between the walls of the recesses 47 and 54 will continuously decrease, as clearly shown in Fig. 6, until the wall portion of the recesses 47 will have passed beyond the wall portion of the recesses 54 corresponding thereto, and as there is one of each of the recesses 47 at each side of each of the recesses 54 and vice versa, the corners of the ribs adjacent said recesses will cut through the grain gradually from all sides thereof (as will be evident from Fig. 6) thus cleanly cutting the grain into a plurality of pieces, indicated by the numeral 62 in Fig. 7.

When said cutting has taken place the pieces of grain 62 will be lodged in the circumferentially extending grooves 51 and in the corresponding grooves 63 which are located between the ribs 53, as shown in Fig. 4. Suitable means is provided for dislodging the pieces of cut grain 62 from within the circumferentially extending grooves.

In Fig. 8 a portion of the cutter member 52 is shown after the same has passed the point of engagement with the cutter member 45 and it will be seen from this figure that the pieces of cut grain 62 are lodged in the grooves 63 between the ribs 53. In a similar manner, Fig. 9 shows the pieces of cut grain 62 lodged between the circumferentially extending ribs 46 on the member 45, said pieces being located in the grooves 51. The means for dislodging the cut grains 62 from the grooves 63 comprises a plurality of stationary dislodging members or blades 64. Said blades are provided with tapering end portions 65 forming wedgelike portions entering between the ribs 53, the obliquely extending face 66 thereof engaging with the cut pieces 62 to force the same outwardly from within the grooves 63 and causing the same to drop downwardly, as clearly shown in Fig. 1. The members 64 are each provided with a pair of notches or recesses 67 into which the holding members 68 extend. The holding members 68 are made in the form of bars extending lengthwise of the machine and are held in place by means of the set screws 69 extending through the arms 70 of the brackets 71 provided at each end of the machine. It will be seen that the position of the members 64 can be adjusted so as to obtain the desired engagement of the wedge points 65 on the members 64 so as to efficiently dislodge the grain from the grooves. It will be seen that due to the engagement of the clamping members 67 in the grooves 68, movement of the blades or dislodging members 64 lengthwise thereof will be prevented. It will also be seen that the grain which is dislodged will drop into the hopper 72 having the inclined wall portion 73, due to the action of gravity.

The cutter member 45 is provided with similar dislodging members 74, having a wedgelike end portion 75 entering the grooves 51 to dislodge the cut grain 62 therefrom by engagement with the inclined face 76 thereof. The members 74 are provided with grooves 77 corresponding to the grooves 67 in the members 64 and with clamping members 78 operating in the same manner as members 68. Said members 78 are clamped in engagement with the members 74 by means of the set screws 79 extending through the arms 80 of the bracket 81 provided at opposite ends of the machine. The members 64 and 74 and the members 68 and 78 are substantially identical. The members 68 and 78 are also so made as to hold the members 64 and 74 respectively in properly spaced relationship. How this is done will be apparent from Fig. 2 in which it will be seen that the members 78 are provided with notches or grooves 82 for receiving the edges of the members 74 therein. Thus each member 74 will fit into a groove in each of the members 78 so as to hold said members 74 properly spaced so as to alternate with the ribs 46 on the member 45, thus holding the same parallel and properly spaced. The members 74 dislodge the grain in the same manner as the members 64 and the pieces 62, dislodged, will drop into the hopper 72 in the manner described above. The members 64 and 74 clean the cutter members thoroughly and as the same rotate again into proper position so that member 45 will pick up the grain and carry it to the point of engagement of the members 52 and 45, there

will be no previously cut grain remaining in said member 45 and, furthermore, the member 52 will be completely cleaned out.

The amount of grain fed to the device may be varied in accordance with conditions and, accordingly, the member 19 is adjustably mounted in the hopper 118 so that the space between the lower edge 25 of said member 19 and the member 22 can be varied, thus permitting more or less grain to pass over the member 22 onto the member 26. Said member 19 is provided with a handle 83 for moving the same into adjusted position and the member 19 is mounted in suitable guide grooves 84 in the side members 17 to permit sliding movement for adjusting the amount of grain dropping into the pocket between the members 38 and 26.

In Figs. 12 and 13 is shown a cutting device which comprises the rotary cutter member 45′ corresponding to the cutter 45 and arranged in the same relative position to the other parts of the apparatus, as shown in Fig. 1, as is the cutter member 45. Said member 45′ is provided with ribs 46′ and grooves 51′ corresponding to the ribs 46 and grooves 51 of the member 45. The ribs 46′ are provided with transversely extending aligned recesses 47′ corresponding to the recesses 47 in the member 45, thus providing the tooth-like members 48′ between said recesses 47′. Co-operating with said cutter member 45′ is the cutter member 52′ mounted on the shaft 32′. Said cutter member 52′ rotates in the same direction as does the cutter member 52 in Fig. 1 and is provided with a plurality of circumferentially extending ribs 90 which have beveled faces 91 to provide a cutting edge 92. The cutting edges 92 are spaced equal distances apart and engage with the grains 27 to cut the same into the pieces 62. In this case the cutting takes place where the sharpened edges 92 engage with the grains and instead of the cutting taking place at each of the corners of the ribs, the cutting only takes place at the edges of the beveled ribs 90. Accordingly, if the grain is to be cut in as small sized pieces as by the device previously described, it would be necessary to place the ribs or circumferential cutting teeth closer together transversely of the device.

While in the form shown above two co-operating rotary cutters are used, it is not absolutely necessary that both cutters rotate and a device in which one of the co-operating members is stationary is shown in Fig. 14. In Fig. 14 the spreader member 22′ shown as being mounted on the shaft 21′ to feed the grain 27 in an even layer on the inclined member 26′ from which the rotary feeding member 38′, mounted on the shaft 28′ and provided with the curved guard member 42′, carries the grain in the pockets 39′ to the rotary cutter member 45″ having the pockets 47″ therein, said member 45″ being mounted on the shaft 34″. Co-operating with said rotary cutter member 45″ is the stationary cutter member made up of the cutting elements 93 which are held in adjusted position by means of the clamping bars 94, corresponding in construction to the clamping bars 68 shown in Fig. 1, which are adjustable by means of the set screws 95 extending through the arms 96 of the brackets 97. The members 94 are similar in construction to the members 68 and are adapted to hold the cutter members 93 in properly spaced relationship.

In Fig. 15 the manner in which the rotary and stationary cutter members co-operate is more clearly shown. The rotary cutter 45″ is provided with grooves 51″ and ribs 46″ corresponding to the grooves 51 and 51′ and the ribs 46 and 46′ previously described. The members 93 are provided with cutting edges 98 which are adapted to enter between the ribs 46″ as the member 45″ rotates, the extreme end portion of the member 93 being curved somewhat as shown at 99 in Fig. 4, or may be made with a straight inclined edge 100 as shown in Fig. 16. It will be evident that no matter whether the cutting edges of the members 93 are curved or straight, the grains lodged in the recesses 47″ will be gradually cut through by the stationary cutter members in a very similar manner to which the rotary cutter member 52 co-operates with the member 45 to cut the grain lodged in the grooves 47. The members 93 should extend in such a direction and should be provided with a cutting edge so shaped that the cutting is gradual, thus providing a clean cut and less dust and irregular sized pieces than where cutting is done only from one edge of the grain. In order to prevent the stationary cutter members 93 from becoming clogged with the cut grain, said members are cut away as shown at 101 in Figs. 14 and 15, and as shown at 102 in Fig. 16, to provide spaces 103 between the members 93 greater than the thickness of the cut pieces of grain 104, thus permitting the cut pieces of grain to drop through the members 93 into the bins as shown in Figs. 1 and 2.

Having thus described my invention what I desire to claim and secure by U. S. Letters Patent is:

1. In a device of the character described, a pair of co-operating rotary cutter members, and a rotary feeding member for feeding grain to the top portion of one of said cutter members by gravity, said one cutter member being positioned below said other cutter member and feeding the grain into engagement with the other cutter member in parallel rows.

2. In a device of the character described, a pair of co-operating cutter members, each of

said cutter members having a plurality of recesses therein adapted to receive objects to be cut in rows extending substantially transversely to the direction of movement of said cutter members and having a plurality of recesses extending substantially in the direction of movement thereof, and means whereby the transversely extending recesses of said cutter members positively align at the point at which said cutter members move into cutting relation.

3. In a grain cutting machine, a pair of cutting rolls, said rolls having alternate circumferential grooves and ribs thereon, the ribs on one of said rolls meshing with the grooves on the other of said rolls and means for feeding grain to said rolls parallel to the axis thereof, each of said rolls having grain holding recesses in said ribs.

4. In a grain cutting machine, a pair of cutting rolls, said rolls having alternate circumferential grooves and ribs thereon, the ribs on one of said rolls meshing with the grooves on the other of said rolls and means for feeding grain to said rolls, each of said rolls having grain receiving recesses in said ribs, said recesses being arranged in rows transversely of said ribs and being provided with curved cutting edges.

5. In a grain cutting machine, a pair of cutting rolls, said rolls having alternate circumferential grooves and ribs thereon, the ribs on one of said rolls meshing with the grooves on the other of said rolls and means for feeding grain to said rolls, each of said rolls having grain receiving recesses in said ribs, said recesses being arranged in rows transversely of said ribs and being provided with curved cutting edges, said rolls being arranged to rotate in such a relative manner that said cutting edges gradually cut through the individual grains.

6. In a grain cutting machine, a pair of cutting rolls, said rolls having alternate circumferential grooves and ribs thereon, the ribs on one of said rolls meshing with the grooves on the other of said rolls and means for feeding grain to said rolls, each of said rolls having grain receiving recesses in said ribs, said recesses being arranged in rows transversely of said ribs and being provided with concavely curved cutting edges, said rolls being arranged to rotate in such a relative manner that said cutting edges gradually cut through the individual grains from the outer surface toward the center thereof.

7. In a grain cutting machine, a pair of cutting members, said members intermeshing and each having ribs thereon, said ribs having grain holding recesses therein, and means for relatively moving said cutting members so that said cutting members gradually cut through the individual grains from around the surface thereof toward the center thereof.

8. In a grain cutting machine, a cutting roll having alternate circumferential ribs and grooves, each of said ribs having equally spaced transverse arcuate substantially symmetrical grooves therein.

9. In a grain cutting machine, a cutting roll having alternate circumferential ribs and grooves, each of said ribs having equally spaced transverse arcuate substantially symmetrical grooves therein, said grooves being arranged in rows transverse to said ribs.

10. In a device of the character described, a feeding device having transverse grain carrying grooves, a cutter member having grain receiving grooves and a driving connection between said feeding device and said cutter member for moving said member relative to said feeding device so that each of said grooves in the feeding device moves into superposed relation to one of the grooves of said cutter member, said feeding device rotating about an axis out of vertical alignment with the axis of rotation of said cutter member to feed the grain to said cutter member grooves by gravity before the same reach the uppermost point of their movement.

11. In a device of the character described, a pair of intermeshing cutter members each having rows of recesses extending transversely thereof, and a driving connection between said members for moving said members at such relative speeds that each of said rows of recesses in one of said members moves into alignment with one of said rows of recesses in the other of said members where said members intermesh.

12. In a device of the character described, a cutter member having a plurality of grooves therein extending in the direction of movement thereof, stationary members entering said grooves for ejecting cut material from said grooves and grooved clamping members for holding said stationary members in spaced relationship.

13. In a device of the character described, a cutter member having a plurality of grooves therein extending in the direction of movement thereof, stationary members entering said grooves for ejecting cut material from said grooves and adjustable grooved clamping members for holding said stationary members in spaced relationship, and adjusting the position thereof.

14. A grain cutting machine comprising a hopper, a spreading device at the discharge end of said hopper, a rotary feeding device, a cutting roll receiving the grain from said feeding device, a cutting roll co-operating with said first mentioned roll to cut said grain, and stationary ejecting devices for removing the grain from said cutting rolls.

15. In a grain cutting machine, a pair of rolls, said rolls having alternating grooves and ribs thereon, the ribs on one of said

rolls meshing with the grooves on the other of said rolls and rotary means for feeding grain to said rolls by gravity, one of said rolls rotating about an axis above the axis of rotation of the other roll.

16. A grain cutting machine comprising a feeding device and a pair of grooved intermeshing cutter members having concave transverse rows of grain pockets therein, said cutter members intermeshing so that the curved edges of transversely adjoining pockets at the point of intermeshing thereof gradually close in on the grain from all sides to cut the same from the outer surface toward the center thereof.

17. In a grain cutting machine comprising a feeding device and a pair of grooved intermeshing cutter rolls having concave transverse rows of grain pockets therein, said cutter rolls intermeshing so that each row of pockets of one roll aligns with a row of pockets of the other roll at the point of intermeshing thereof so that the curved edges of transversely adjoining pockets gradually close in on the grain from all sides to shear the same from the outer surface toward the center thereof.

18. A grain cutting machine comprising a feeding device, a pair of grooved intermeshing cutter rolls having concave transverse rows of grain pockets therein, said cutter rolls intermeshing so that each row of pockets of one roll aligns with a row of pockets of the other roll at the point of intermeshing thereof and the curved edges of transversely adjoining pockets gradually close in on the grain from all sides to shear the same from the outer surface toward the center thereof. Said intermeshing portions of said rolls cooperating to force the cut pieces of grain into said grooves and means for removing said pieces from said grooves.

19. A grain cutting machine comprising a feeding device, a transversely grooved roll receiving the grain from said feeding device, and a cutting roll interengaging with said first mentioned roll above the axis of rotation thereof to cut said grain.

20. In a device of the character described, a cutting roll, a co-operating cutting roll rotating about an axis to one side and above the axis of said first cutting roll and a feeding roll rotating about an axis above and to the other side of the axis of said first cutting roll to feed grain thereto by gravity on the upwardly travelling side thereof.

In witness whereof, I hereunto subscribe my name this 7th day of June A. D., 1923.

LESTER L. LADD.