Oct. 16, 1945. C. E. KERR 2,386,955

CORN CUTTER

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FIG_1

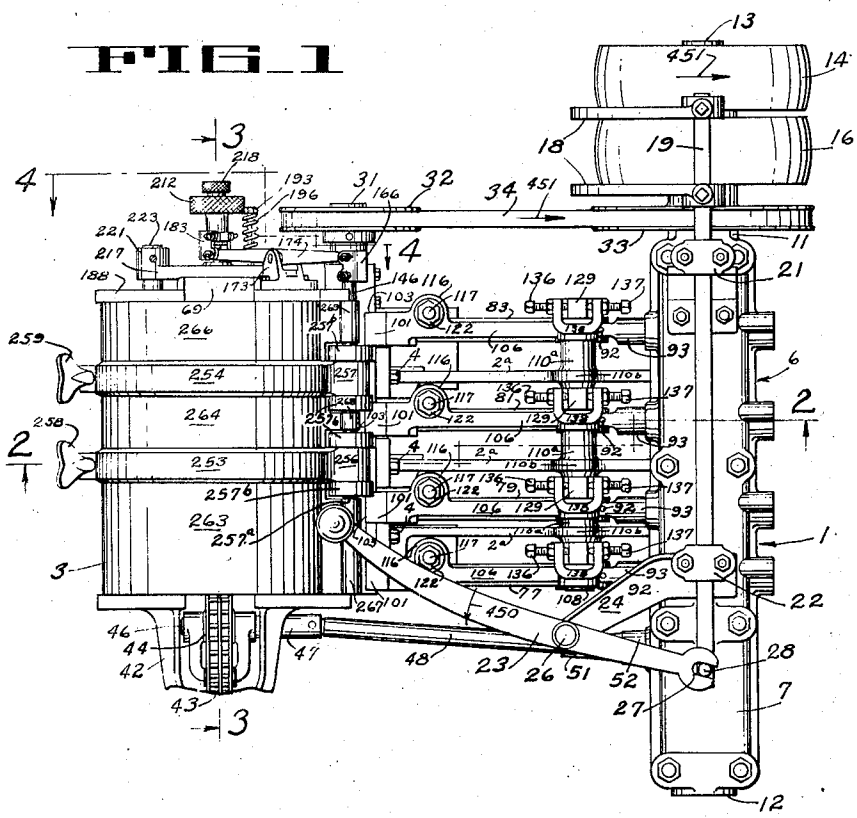
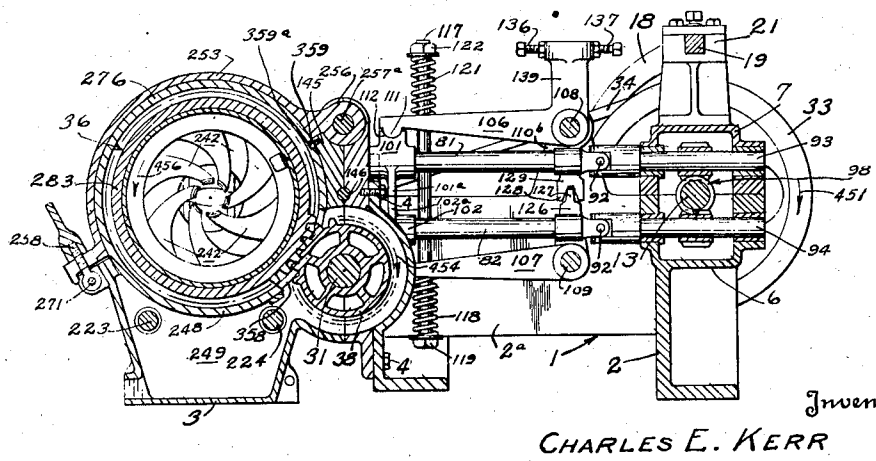


FIG_2



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CORN CUTTER

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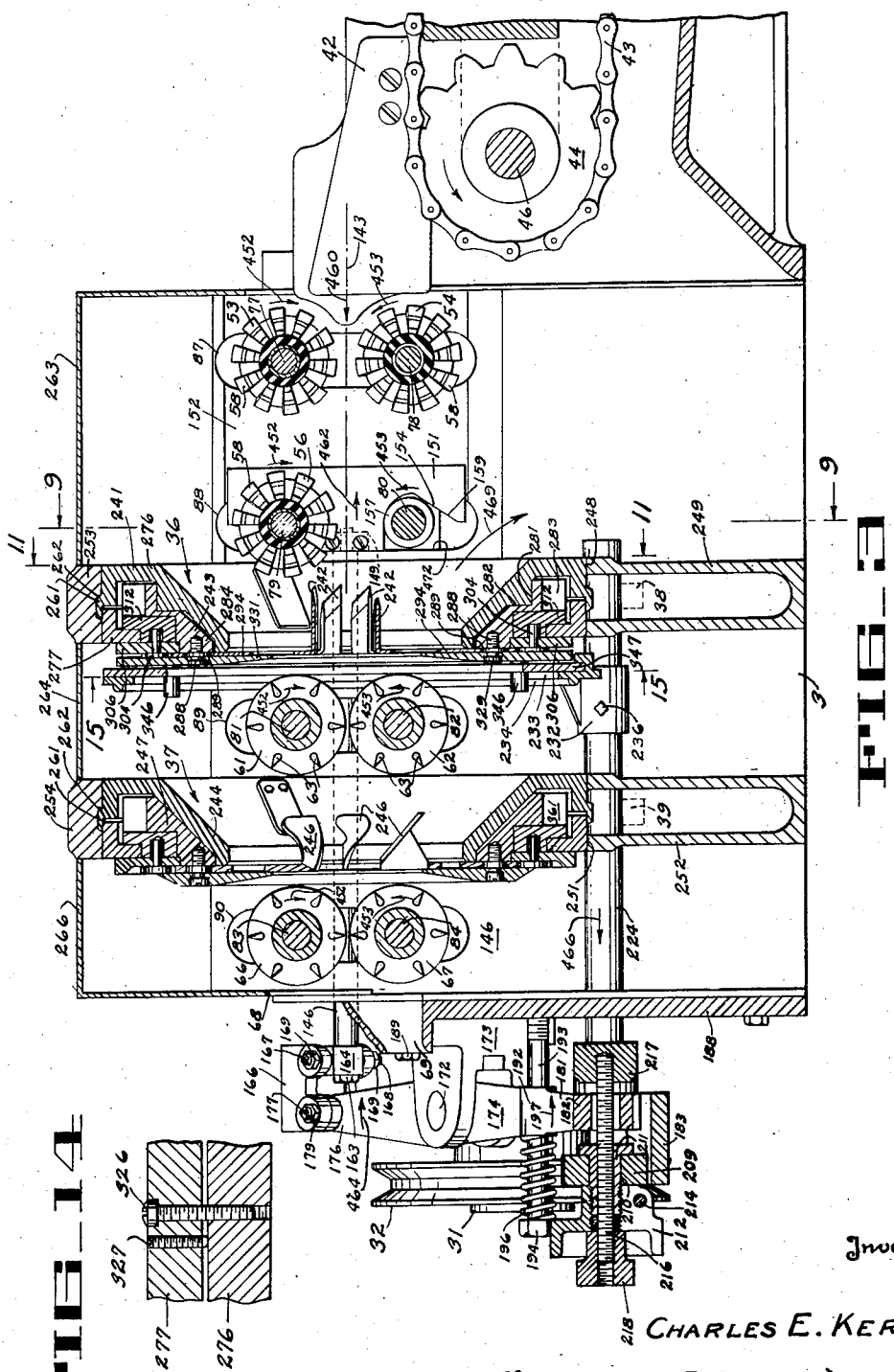


FIG. 3

FIG. 14

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CORN CUTTER

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FIG_4

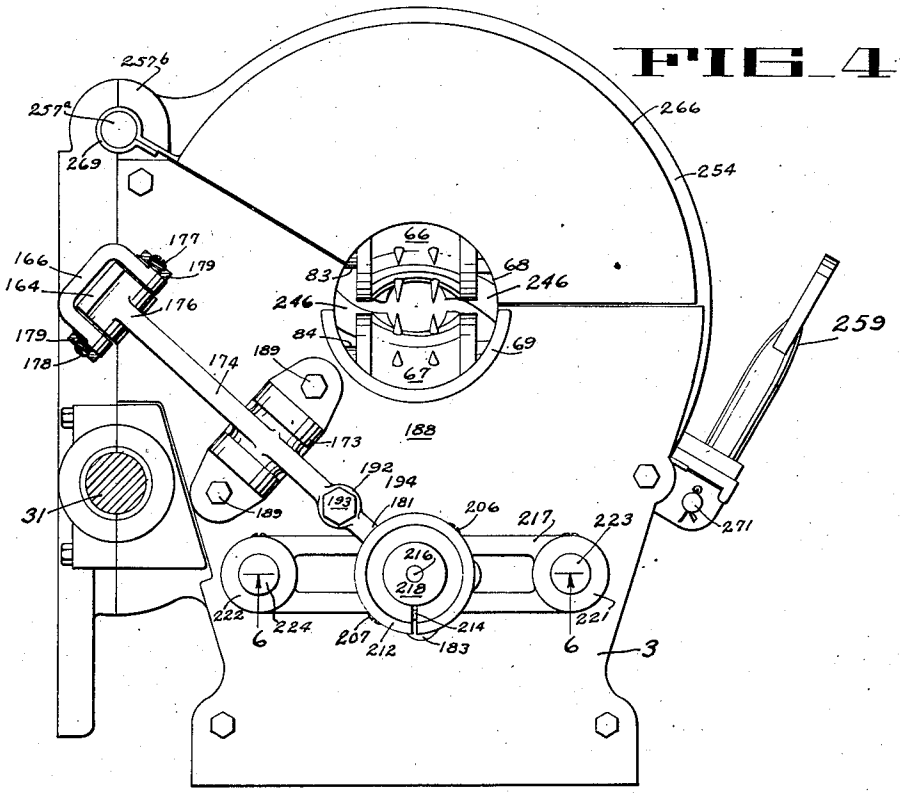


FIG_7

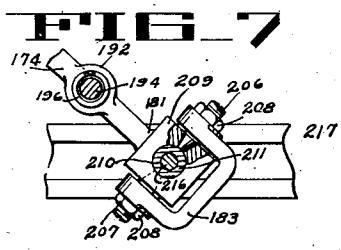


FIG_6

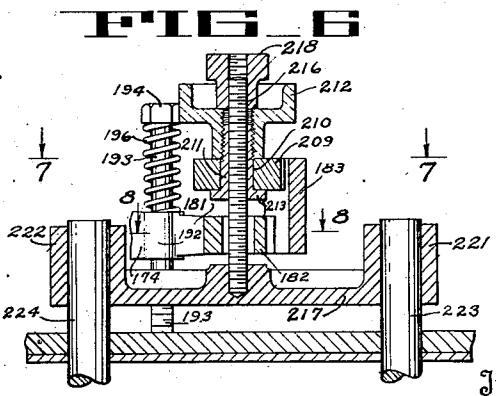
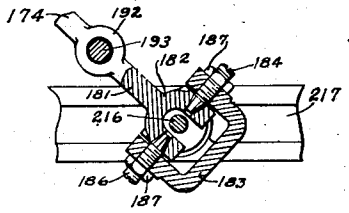


FIG_8



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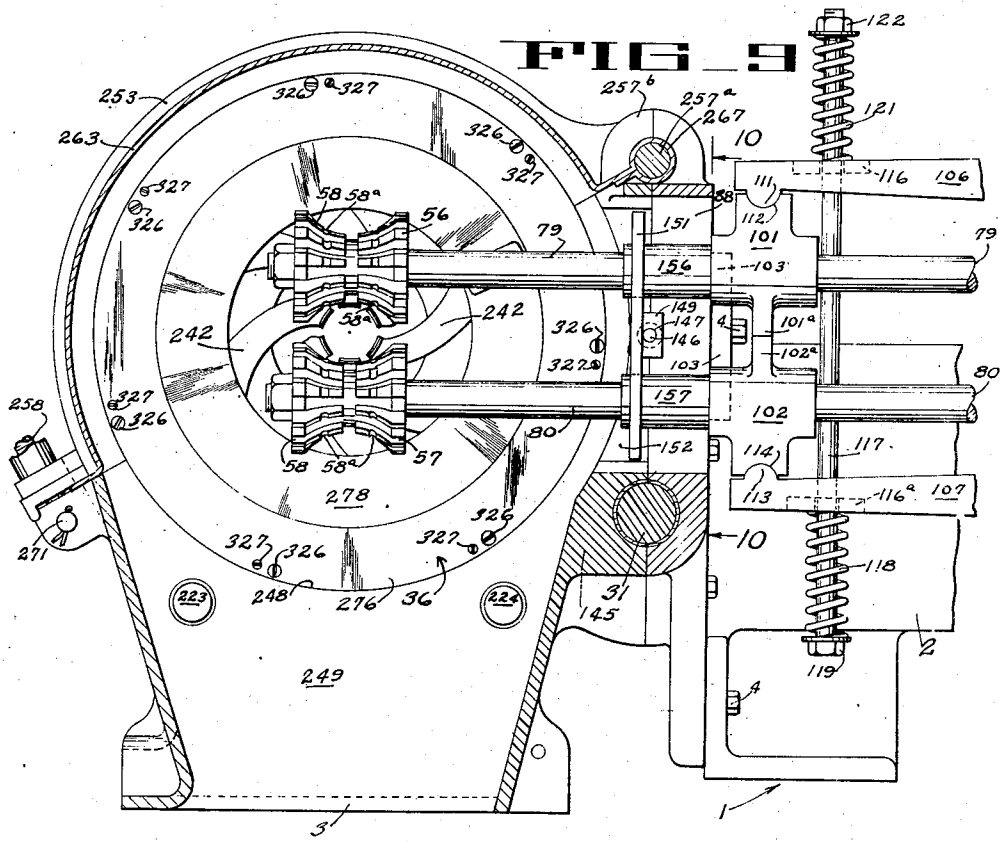
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CORN CUTTER

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FIG_9



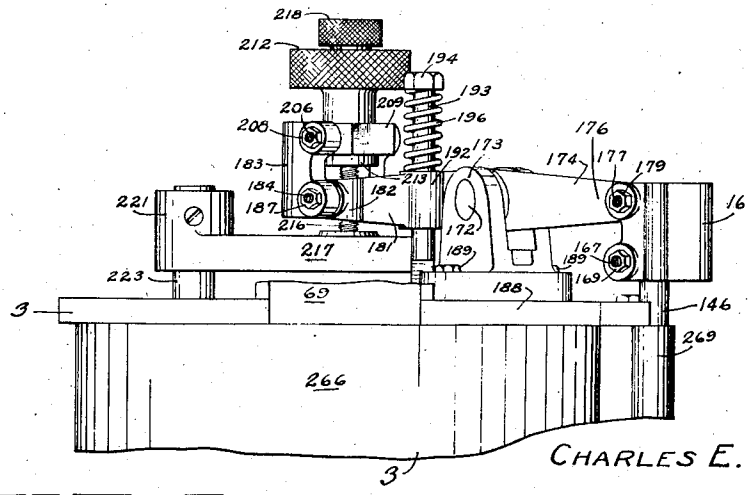


FIG_5

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FIG. 21

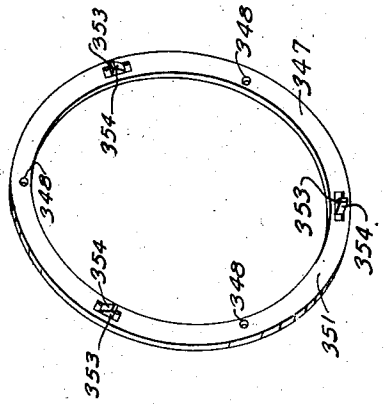


FIG. 10

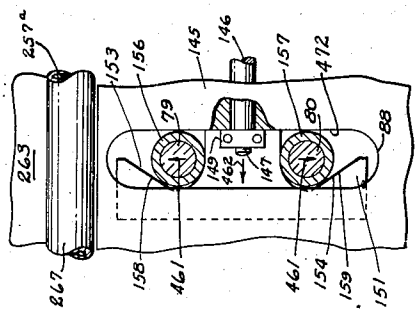


FIG. 20

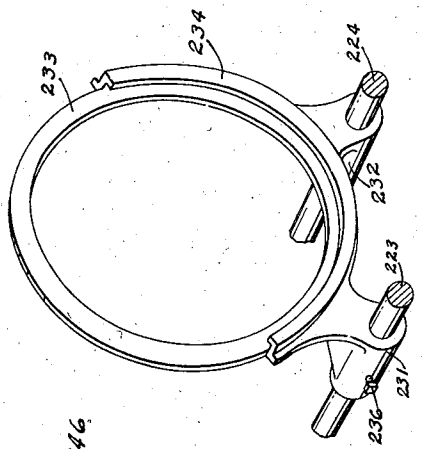


FIG. 13

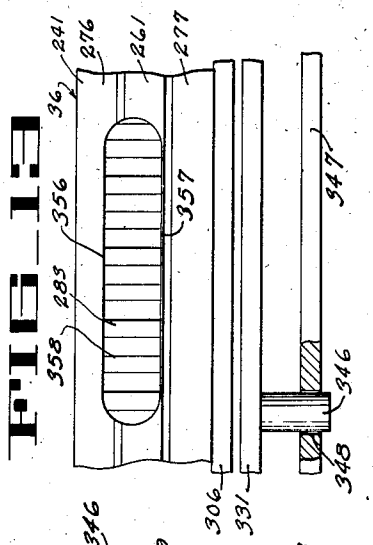
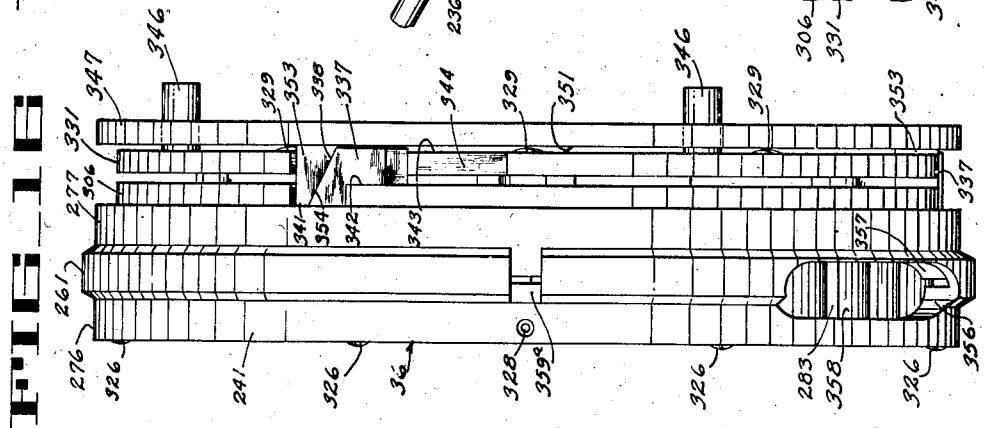


FIG. 16



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CORN CUTTER

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FIG. 11.

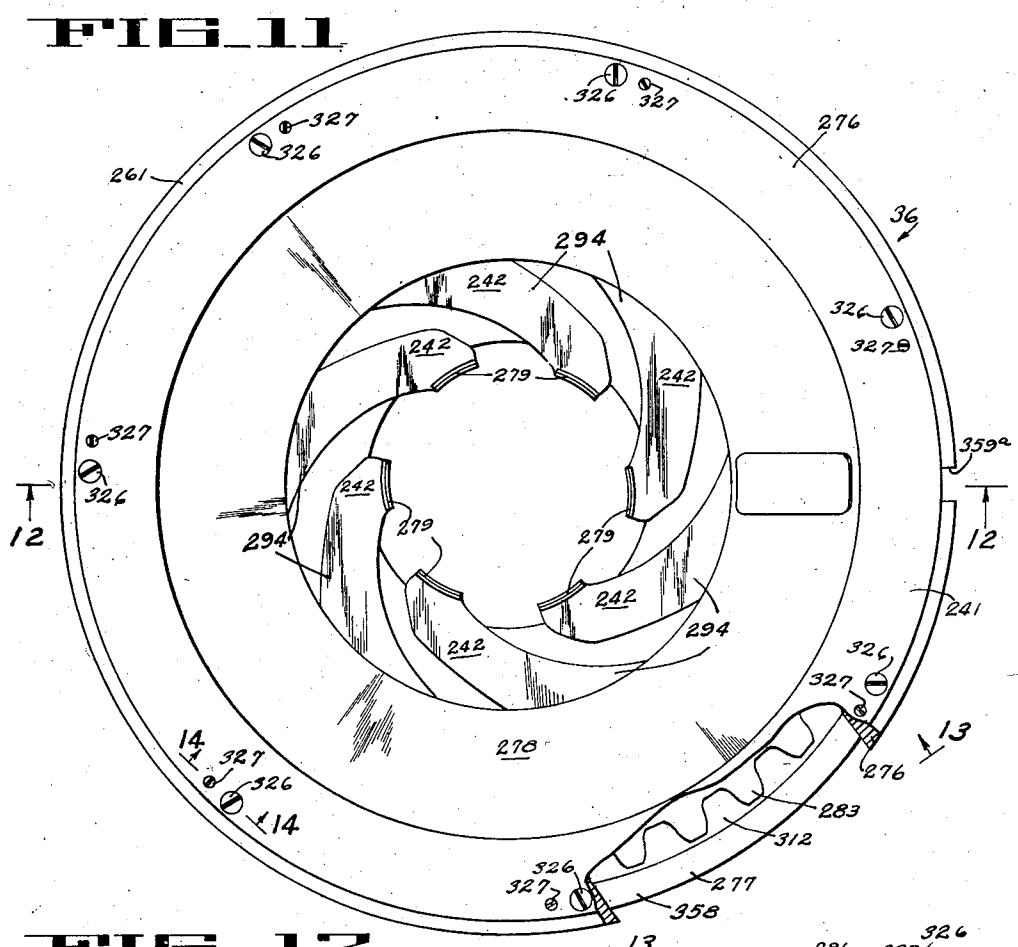
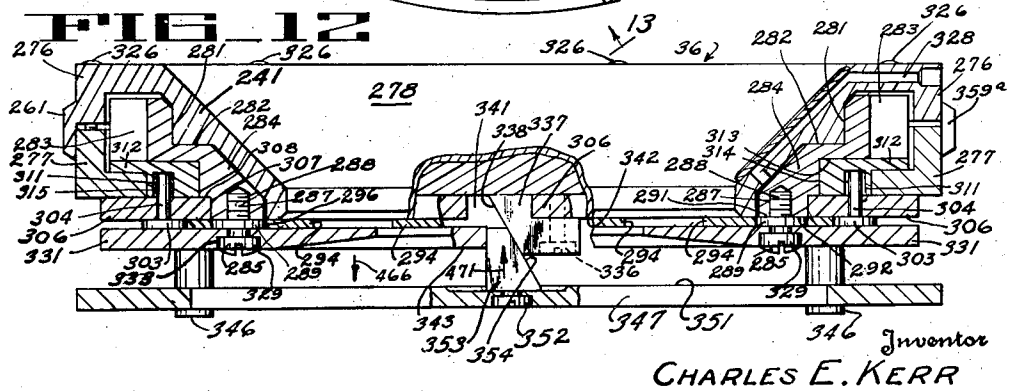


FIG. 12.



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FIG_15

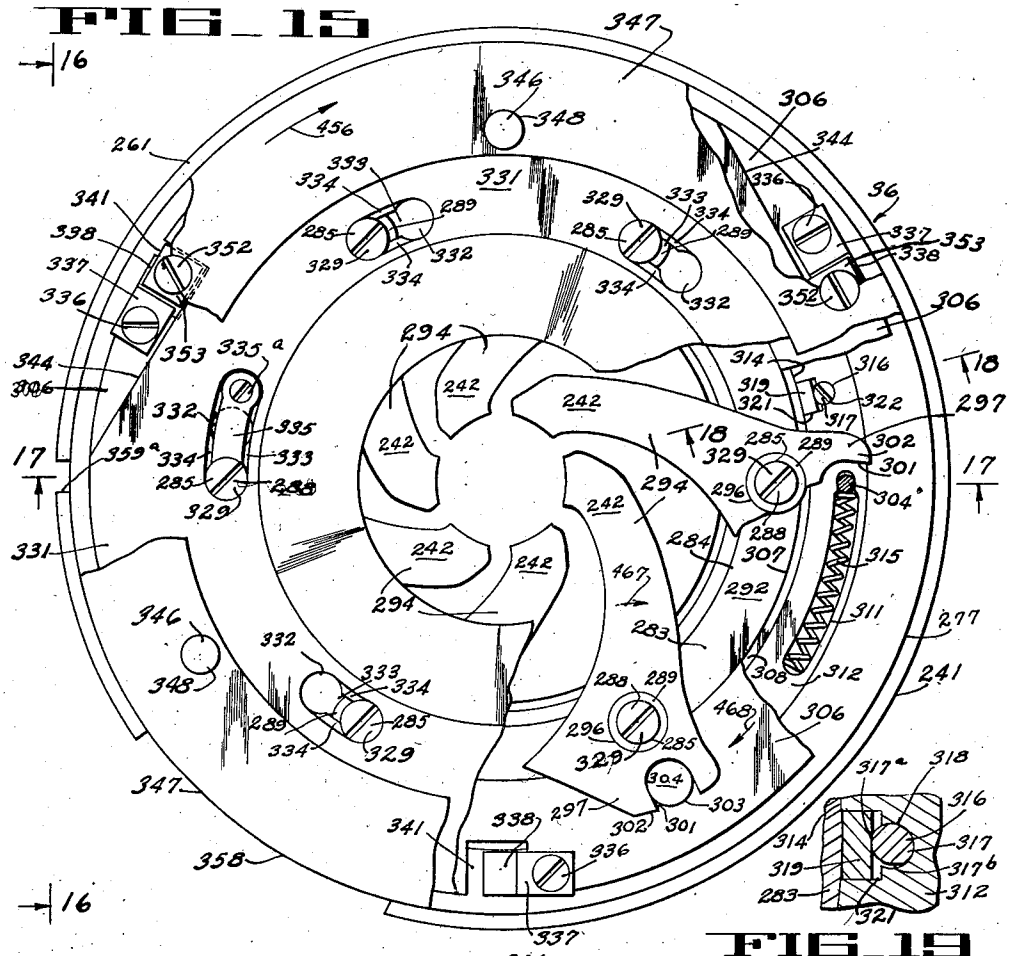


FIG_19

FIG_17

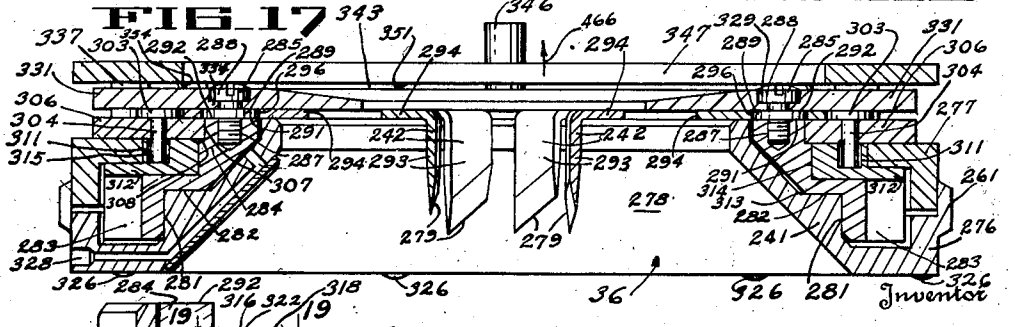
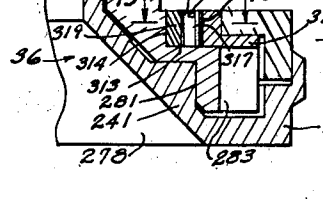


FIG_18



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Patented Oct. 16, 1945 2,386,955

UNITED STATES PATENT OFFICE

2,386,955

CORN CUTTER

Charles E. Kerr, Hoopeston, Ill., assignor to Food Machinery Corporation, San Jose, Calif., a corporation of Delaware

Application November 8, 1943, Serial No. 509,346

26 Claims. (Cl. 130—9)

The present invention relates to corn cutters for cutting the kernels from ears of green corn.

One object of the invention is to provide a corn cutter wherein the cutting knives are opened by centrifugal force and gauge means are provided to limit the degree of opening of the knives according to the size of the ear to be treated thereby.

Another object is to provide a corn cutter wherein opening of the knives is controlled by the feed rolls but in which the knives are not positively actuated by the opening movement of the feed rolls.

Another object is to provide a corn cutter wherein the opening of the knives is so controlled as to prevent them from flying open beyond the limit determined by the size of the ear of corn to be treated thereby.

Another object is to provide a corn cutter wherein excessive wear of the knife control mechanism is eliminated.

Other and further objects and advantages of the invention will become apparent from the following description and accompanying drawings in which:

Fig. 1 is a plan view of the corn cutter of the present invention.

Fig. 2 is a transverse section of Fig. 1 taken along lines 2—2 thereof, certain parts being shown in elevation.

Fig. 3 is an enlarged longitudinal section of the machine taken along lines 3—3 of Fig. 1.

Fig. 4 is an enlarged view of a portion of the machine taken along lines 4—4 of Fig. 1.

Fig. 5 is an enlarged view of a portion of Fig. 1 showing the discharge end of the machine.

Fig. 6 is a section of a portion of Fig. 4 taken along lines 6—6 thereof.

Fig. 7 is a section of a portion of Fig. 6 taken along lines 7—7 thereof.

Fig. 8 is a section of a portion of the machine taken along lines 8—8 of Fig. 6.

Fig. 9 is an enlarged transverse section of a portion of the machine taken along lines 9—9 of Fig. 3, certain parts being shown in elevation.

Fig. 10 is a section of a portion of Fig. 9 taken along lines 10—10 thereof.

Fig. 11 is an enlarged front view of the cutting head of the machine taken along lines 11—11 of Fig. 3, a portion of the cutting head being broken away, the cutting knives being shown in open position.

Fig. 12 is a section of Fig. 11 taken along lines 12—12 thereof, certain portions being broken away.

Fig. 13 is a side view of a portion of the cutting head of Fig. 11 taken along lines 13—13 thereof.

Fig. 14 is a section through a portion of the cutting head taken along lines 14—14 of Fig. 11.

Fig. 15 is an enlarged rear view of the cutting head of the machine taken along lines 15—15 of Fig. 3, certain portions being broken away, the knives being shown in closed position.

Fig. 16 is a side elevation of the cutting head of the machine taken in the direction of arrows 16—16 of Fig. 15.

Fig. 17 is a section of Fig. 15 taken along lines 17—17 thereof.

Fig. 18 is a section of a portion of Fig. 15 taken along lines 18—18 thereof.

Fig. 19 is a section of a portion of Fig. 18 taken along lines 19—19 thereof.

Fig. 20 is a perspective view of the pressure plate support.

Fig. 21 is a perspective view of the annular pressure plate of the machine.

Referring now to the drawings and especially to Figs. 1, 2, 3 and 9, 1 designates the frame work of the machine consisting of a casting 2 and a housing 3 secured thereto by means of screws 4. The casting 2 includes a gear casing 6 provided with a removable cover 7. The frame work 1 may be mounted upon a base, not shown, at a convenient height for the operator who serves the machine.

Rotatably mounted within bearing portions 11 and 12 of the gear casing 6 is a main drive shaft 13 (see Figs. 1 and 2) provided with a drive pulley 14 keyed thereto and an idler pulley 16 freely rotatable thereon. The drive pulley 14 is driven from a source of power by means of a drive belt (not shown). A belt shifting fork 18 including a shifting rod 19 slidably mounted within bearings 21 and 22 of the cover 7 is employed for shifting the drive belt from the idler pulley 16 upon the drive pulley 14 and vice versa.

The belt shifting fork is operated by a shifting lever 23 pivotally mounted on a bracket 24 of the cover 7 at 26 and provided with a jaw 27 in which a pin 28 secured to shifting rod 19 is received. It is therefore apparent that by shifting of the lever 23 in one or the other direction the belt shifting fork 18 is operated to shift the drive belt from the idler pulley 16 to the drive pulley 14 and vice versa to thereby start and stop the machine.

Rotatably mounted within the frame structure

of the machine and extending into housing 3 thereof is an auxiliary drive shaft 31 (see Figs. 1 and 2) provided with a belt pulley 32 keyed thereto. Trained around the belt pulley 32 and a belt pulley 33 keyed to shaft 13 is a drive belt 34 so that upon rotation of shaft 13 shaft 31 is correspondingly rotated. Mounted within the housing 3 is a rotary cutting head 36 and a rotary scraping head 37 (see Fig. 3), these being driven by gears 38 and 39, respectively, keyed to shaft 31.

Mounted in front of the housing 3 is a feed trough 42 within which an endless feed chain 43 trained around a power driven sprocket gear 44 and an idler sprocket gear, not shown, is arranged. The gear 44 is keyed to a shaft 46 which in turn is connected by a universal joint 47 to a shaft 48 (Fig. 1). The shaft 48 is connected by a universal joint 51 to a shaft 52 driven by shaft 13 through the medium of worm gearing, not shown, positioned inside the gear casing 6.

The husked ears of corn are deposited in the feed trough 42 and are carried along the same by means of the feed chain 43 with their axes substantially parallel to the longitudinal axis of the cutting and scraping heads 36 and 37. A pair of feed rollers 53, 54 (Fig. 3) receives each ear of corn from the trough 42 and feeds it into the machine. A second pair of feed or gauge rollers 56, 57 cooperates with the first pair 53, 54 to align the axis of the ear with the axis of the cutting head 36 and to feed the ear into the cutting head.

The feed rolls 53, 54, 56 and 57 (see Figs. 3 and 9) are similar in construction, each being preferably made of soft rubber or similar resilient material formed to provide upstanding ribs or spurs 58. Each roll is spool-shaped (see Fig. 9) and of such configuration that each pair of rolls centers the ear of corn horizontally, placing it in alignment with the axis of the cutting head 36. By employing ribbed rubber feed rolls sufficient grip is obtained on the ears of corn to feed them into the cutter heads without injuring the kernels thereof. The feed rolls 53, 54, 56 and 57 are further provided with circumferential grooves 58a in the ribs 58 to prevent rotation of the ear passing therebetween.

As each ear of corn passes through the cutter head 36 it passes between another pair of spool-shaped feed rolls 61, 62 which feed it into the scraping head 37. The feed rolls 61, 62 may preferably be made of metal and provided with pointed metal prongs or teeth 63 (see Fig. 3) which penetrate the ears and aid the feeding thereof. The diameter of the rolls 61 and 62 is preferably greater than that of the preceding rolls to accelerate the feed of each ear into the scraping head 37 in order to make way for the following ear.

When the cob leaves the scraping head 37, it passes between feed or discharge rolls 66, 67 which are of similar construction to the feed rolls 61, 62, but preferably of greater diameter, to accelerate the feed. The rolls 66, 67 discharge the cobs through an opening 68 in the housing 3 into a discharge chute 69 which in turn discharges them from the machine.

The feed rolls 53, 54, gauge rolls 56, 57, feed rolls 61, 62 and discharge rolls 66, 67 are carried by shafts 77, 78; 79, 80; 81, 82; 83 and 84 respectively, and are fixed thereto for rotation therewith in any convenient manner (see Figs. 1 to 4 and 9). The shafts 77 to 84 inclusive extend through elongated slots 87, 88, 89 and 90 in the housing 3 (see Figs. 3 and 9) and are connected by universal joints 92 to upper and lower shafts 93 and 94 respectively. The shafts 93 and 94 are rotatably mounted in the gear casing 6 and are rotated in opposite directions by shaft 13 through worm gearing generally designated 98.

The arrangement and construction of shafts 77 and 83 correspond to that of shaft 81 shown in Fig. 2. Likewise the arrangement and construction of shafts 78 and 84 correspond to that of shaft 82 in said figure. The structure and arrangement of shafts 79 and 80 has been illustrated in Fig. 9 and will be more specifically referred to later on. All of the upper and lower shafts 93 and 94 are of the same construction as shown in Fig. 2.

From the above, it is apparent that the cooperating feed, gauge and discharge rolls and the shafts carrying the same are freely movable toward and away from each other by reason of the universal joints 92 so as to permit the passage of the ears of corn between cooperating rolls.

Cooperating pairs of the roll shafts 77 to 84 (see Figs. 1, 2 and 3) are confined to swinging movement in a vertical plane by bearing blocks 101 and 102 in which the shafts 77, 79, 81, 83 and 78, 80, 82, 84, respectively, are rotatably mounted. The bearing blocks 101 and 102 are vertically slidable in guide channels 103 (see Figs. 1 and 9) on the housing 3 of the frame structure 1 of the machine.

Mounted above each of the upper shafts 77, 79, 81 and 83 is an equalizer arm 106 while below each lower shaft 78, 80, 82 and 84 there is an equalizer arm 107. The upper equalizer arms 106 are pivoted on a stud shaft 108 and the lower equalizer arms are pivoted on a stud shaft 109. The stud shafts 108 and 109 are fixed in bearings 110a secured to ears 110b on partitions 2a forming part of the main casting 2 of the machine (see Fig. 2). Each of the upper equalizer arms 106 has a trunnion 111 which fits into an arcuate groove 112 in the bearing block 101 associated therewith. Likewise, each lower equalizer arm 107 has a trunnion 113 fitting in an arcuate groove 114 in the bearing block 102 associated therewith (see Figs. 2 and 9). Opposing upper and lower equalizer arms have apertured lugs 116 and 116a, respectively, through which a bolt 117 extends (see Figs. 2 and 9). A coil spring 118 is interposed between each lower equalizer arm 107 and the head 119 on each bolt 117 while a similar coil spring 121 is interposed between each upper equalizer arm 106 and a nut 122 on each bolt 117. The springs 118 and 121 urge the equalizing arms 106 and 107, the bearing blocks 101 and 102 and opposing shafts 77, 79, 81, 83 and 78, 80, 82, 84 toward each other and hold the feed rolls mounted on said shafts in engagement with the ears of corn. Stops 101a and 102a on bearing blocks 101 and 102, respectively, limit the movement of opposing shafts 77 to 84 toward each other to prevent contact between the opposing rolls thereon.

To equalize the movement of the shafts of cooperating feed, gauge and discharge rolls, each of the upper arms 106 is interconnected with its cooperating lower arm 107 for equalized movement therewith. Each lower arm 107 has an upstanding arm portion 126 provided with a tooth 127 (Fig. 2) which engages a jaw 128 of a lever 129 rotatably mounted on each stud shaft 108, there being a lever 129 for each equalizer arm 106. The upper end of each lever 129 is disposed between opposing adjusting screws 136 and 137 threaded into a U-shaped portion 138 of an upstanding projection 139 of each equalizer arm

106. By turning screws 136 and 137 the angular position of arm 106 relative to lever 129 and thus relative to arm 107 can be adjusted.

When the machine is properly adjusted all feed, gauge and discharge rolls are normally disposed at equal distances above and below the axis 143 of the cutting and scraping heads as shown in Fig. 3. When an ear of corn enters the machine the rolls are spread apart by the ear against the tension of springs 118 and 121 as it passes between opposing rolls. The rolls 53, 56, 61 and 66 move upwardly, while the rolls 54, 57, 62 and 67 move downwardly as an ear passes therebetween and the amount of yielding movement depends upon the size of the ear, i. e., the diameter thereof. In view of the fact that cooperating equalizer arms 106 and 107 are interconnected, as above stated, opposing feed, gauge and discharge rolls will always be disposed at equal distances from the axis 143 so that each ear of corn during its travel through the machine is maintained with its axis coincident with the axis 143 of the cutting and scraping heads 36 and 37.

Slidably mounted within the wall structure 145 of the housing 3 (Figs 2, 3, 9 and 10) is a control rod 146 provided at its front end with a threaded portion 147 of reduced diameter (Fig. 10). This rod is so disposed within the wall of the housing 3 intermediate opposing roll shafts 79 to 84 that it does not interfere with the vertical swinging movement of the same.

The front end 147 of the control rod 146 is threadedly secured to a supporting block 149 which carries a gauge plate 151 positioned within a recess 152 of the wall structure 145 adjacent the elongated slot 88 through which shafts 79 and 80 extend into the housing 3. This gauge plate has cut-out portions 153 and 154 to accommodate sleeves 156 and 157 fixed to the feed or gauge roll shafts 79 and 80, respectively (see Figs. 3, 9 and 10). The gauge plate 151 is further provided with inclined cam faces 158 and 159 adapted to be engaged by the sleeves 156 and 157, respectively, when shafts 79 and 80 move apart in the manner previously referred to herein. The normal position of the gauge plate 151, i. e., the position of the plate when no ears are passing between the rolls 56, 57 is shown in Figs. 3 and 10.

Secured to the rear end of the control rod 146, which extends beyond the rear end of the housing 3 of the machine, by means of a cap screw 163, is a pivot block 164. A U-shaped connecting link 166 is pivotally mounted on the block 164 by means of set screws 167 and 168. Lock nuts 169 are employed to lock the set screws 167 and 168 in proper position on the link 166.

Pivotally mounted at 172 within a pivot bracket 173 (see Figs. 3 and 4) is a rocker arm 174, the end 176 of which is pivotally mounted within the connecting link 166 by means of set screws 177, 178 held in adjusted position by lock nuts 179. The other end 181 of the rocker arm 174 (see Figs. 1, 3, 4, 5, 6 and 8) forms a yoke 182 pivotally mounted in a U-shaped connecting link 183 by means of set screws 184, 186 locked in position by lock nuts 187. The pivot bracket 173 is secured to the rear wall 188 of the housing 3 by cap screws 189.

The rocker arm 174 is further provided with a boss 192 having a bore through which a cap screw 193 slidably extends (see Figs. 3, 4, 5 and 6). The cap screw 193 is threadedly secured to the back wall 188 of the housing 3 and the bore in the boss 192 is large enough so as not to interfere with the rocking motion of arm 174 specifically referred to later on. Interposed between the head 194 of the cap screw 193 and the rocker arm 174 is a coil spring 196 tending to urge the arm 174 in the direction of arrow 197 in Fig. 3. By turning the cap screw 193 the tension of spring 196 may be adjusted as desired.

Pivotally secured to connecting link 183 by means of set screws 206 and 207, which are locked in position by lock nuts 208, is a pivot block 209, provided with a bore 210 (Figs. 6 and 7). Rotatably mounted on the pivot block 209 by means of a bearing sleeve 211, rotatably received within the bore 210 of the block 209, is an adjusting nut 212 (Figs. 3, 5 and 6). The bearing sleeve 211 is provided with a retaining flange 213. The adjusting nut 212 is threaded onto the bearing sleeve 211 and is in the form of a split clamp nut clamped tightly in proper position to the sleeve 211 by means of a bolt, 214, (Fig. 3) so that upon rotation of the adjusting nut 212 the sleeve 211 is rotated therewith. The sleeve 211 in turn is internally threaded and threadedly received therein is a screw 216, one end of which is threadedly secured to a cross bar 217 so as to be fixed against relative movement thereto, while screwed upon the other end of screw 216 is a lock nut 218 for locking the adjustment nut 212 and sleeve 211 in any desired position on the screw 216, (Figs. 3 and 6).

The cross bar 217 (Figs. 4, 5 and 6) is provided with bosses 221 and 222 in which actuating rods 223 and 224, respectively, are fixed. The actuating rods 223 and 224 are both of the same construction, extend into the housing 3 (Fig. 3) and are slidably mounted therein below the cutting and scraping heads 36 and 37. Both rods are illustrated in Fig. 4 but only one rod, namely rod 224, is shown in Fig. 3. Adjustably mounted on the rods 223 and 224 within the housing 3, intermediate the heads 36 and 37, by means of supporting sleeves 231 and 232 (Figs. 3 and 20), is an annular pressure plate support 233 provided with a channel shaped semi-circular bearing 234 on the lower portion thereof.

The supporting sleeves 231 and 232 (Figs. 3 and 20) form integral parts of the pressure plate support 233 and are provided with set screws 236 for securing the pressure plate support 233 in adjusted position on the rods 223 and 224.

The cutting head 36 previously referred to comprises a housing 241, a plurality of cutting knives 242, and the operating mechanism generally indicated at 243, while the scraping head 37 consists of a housing 244, a plurality of scraping knives 246, and the operating mechanism generally indicated at 247.

The housing 241 of the cutting head 36 is positioned on a semi-circular support 248 of a transverse partition 249 of the housing 3 (Figs. 2 and 3) while the housing 244 of the scraping head 37 is similarly positioned on a semi-circular support 251 of a transverse partition 252 of the housing 3. Semi-circular clamps 253 and 254 hinged at 256 and 257, respectively, on a shaft 257^a supported within ears 257^b of the housing 3 and normally held in closed position on the housing 3 by means of clamp screws 258 and 259 are provided for holding the housings of the cutting heads 36 and 37 in stationary position with the housing 3. A rim 261 on each cutting head housing 241 and 244 received within a groove 262 of the clamps 253 and 254, respectively, assures a proper positioning of the cutting heads within their supporting structure.

Positioned adjacent and intermediate the

clamps 253 and 254 (Fig. 1) are covers 263, 264 and 266, hinged on shaft 257a at 267, 268 and 269, respectively, which close the upper portion of the housing 3 adjacent and intermediate the clamps 253 and 254.

When the clamp screws 258 and 259 are loosened and swung out of the way around their pivots 271 and the clamps 253, 254 and covers 263, 264 and 266 are opened, the complete heads 36 and 37 can be removed from the machine.

Referring now more specifically to the structure of the cutting head 36 (Figs. 3, 11 to 17 incl.) it should be noted that the housing 241 consists of opposing annular bearing members 276 and 277 within which the operating mechanism of the head 36 is rotatably mounted.

The bearing member 276 has a conical portion 278 coaxially disposed with the axis of the head 36 and surrounding the cutting edges 279 of the cutting knives 242 so that it encompasses the cutting zone, i. e., the zone in which the kernels are cut from the cob. The inner face of the conical portion 278 is provided with annular bearing and supporting surfaces 281 and 282 upon which a ring gear 283, having a hub 284, is rotatably mounted. When the cutting head 36 is mounted in the machine as previously described herein the bearing member 276 is held stationary on its support 249 by the clamp 253 while the gear 283 is rotatable within the bearing member 276.

Pivotally mounted on the ring gear 283 at 285 for rotation therewith are the cutting knives 242 provided with the cutting edges 279 previously referred to. The hub 284 of the ring gear 283 has a series of tapped holes 287 (Figs. 12 and 17) in which knife pivot pins 288 are threaded. Each pin 288 has a circular bearing collar 289, the under side of which forms a shoulder 291 which engages the face 292 of the hub 284 when the pivot pin 288 is screwed into the hole 287, so that the pivot pin 288 is rigidly mounted on the hub of the gear 283.

Each knife 242 (Fig. 17) comprises a horizontal portion 293 adjacent the cutting edge 279, which is disposed longitudinally of the axis of the cutting head 36 and an arm portion 294 which extends radially and outwardly from the axis of the head. This portion 294 has an aperture 296 into which the bearing collar 289 of the pivot pin 288 fits, so that each knife 242 is rotatable on its pivot pin 288. Each knife 242 has further a portion 297 (Fig. 15) which extends beyond the pivot pin 288 but is of insufficient weight to balance the weight of the knife portions 293 and 294 on the other side of the pivot pin 288 when the knives are under the influence of centrifugal forces during rapid rotation of the ring gear 283 and knives 242 in operation. In other words, the knives are so constructed and arranged that they tend to fly open under centrifugal force during rapid rotation of the ring 283 and in this respect depart from the prior practice of mechanically and positively opening the knives by the gauge rolls. The significance of this will be brought out later.

Each knife 242 (Fig. 15) has a slot 301 in its outer end portion 302 within which is positioned the head 303 of a pin 304 (Figs. 12, 15 and 17) secured to an equalizing ring 306 carried by the ring gear 283. Annular shoulders 307 and 308 formed on the hub 284 of the ring gear 283 provide a bearing seat for the equalizing ring 306, which is rotatable relative to the ring gear 283. This arrangement serves to equalize the movement of the six knives 242 so that the movement of any one knife about its pivot pin 288 results in a corresponding movement of the other knives, due to the fact that when any knife is moved about its pivot pin 288 it rotates the equalizing ring 306, by reason of the engagement of its slot 301 with the pin 304 on the equalizing ring, thus rotating the other knives which are likewise connected by a similar pin and slot arrangement with the equalizing ring 306, an equal amount about their pivot pins. In other words, the knives are so arranged that they open and close in iris fashion with the cutting edges 279 always equidistant from the axis of the head 36.

Referring now to Figs. 12, 15 and 17, it will be noted that the pins 304, whose heads 303 engage the slots 301 of the knives 242, project through the equalizing ring 306 into arcuate slots 311 formed in a knife adjusting ring 312 positioned intermediate the ring gear 283 and the equalizing ring 306. The knife adjusting ring 312 is rotatably mounted on annular shoulders 313 and 314 (Figs. 12, 17 and 18) formed on the hub 284 of the ring gear 283, but is normally held in locked position thereon.

Disposed in two of the slots 311 of the knife adjusting ring 312 diametrically opposite each other are coil springs 315 which engage the pins 304 projecting into these slots (Figs. 12, 15 and 17). The springs 315 exert a slight pressure against the pins 304 and urge them and the equalizing ring 306 in a counter clockwise direction relative to the ring gear 283 (see Fig. 15) whereby a slight pressure is applied to the knives against movement thereof in a clockwise direction (Fig. 15) which is overcome, however, by the centrifugal forces which open the knives during the operation of the machine. As soon as the centrifugal forces acting upon the inner ends of the knives 242 exceed the slight force of the springs 315, and provided the equalizer ring 306 is not locked against relative movement with respect to the gear 283 and ring 312, the knives 242 open by swinging about their pivots 288 in clockwise direction (Fig. 15) whereby the pins 304 and equalizer ring 306 are shifted clockwise relative to ring gear 283 and the two springs 315 engaged by two of the pins 304 are compressed.

As above stated, normally the knife adjusting ring 312 is locked on the hub 284 of the ring gear 283 by means of a locking mechanism 316 (Figs. 15, 18 and 19) which consist of a small cylindrical cam 317, having a hill portion 317a and a valley portion 317b, rotatably positioned within a substantially semi-circular recess 318 of the knife adjusting ring 312. A rectangular block 319 is slidably mounted within a notch 321 of the ring 312 (Fig. 19) intermediate the cylindrical cam 317 and ring gear 283.

The block 319 bears against the periphery of the annular shoulder 314 of the hub 284 of the ring gear 283 and when the cam 317 is rotated by a screw driver, inserted into a slot 322 thereof, into the position shown in Fig. 19, the hill portion 317a of the cam 317 forces the block 319 against the shoulder 314 of the hub 284 of ring gear 283, whereby the knife adjusting ring 312 is locked on the ring gear 283 for rotation therewith. The friction between recess 318, cam 317 and block 319 maintains these parts in their locked position. When cam 317 is rotated in an opposite direction so that the valley portion 317b is adjacent the block 319, the locking engagement between block 319 and ring gear hub 284 is released to permit relative movement between the ring gear 283 and adjusting ring 312

so that by rotating ring 312 the position of the knives 242, i. e., the amount of closing of the same may be adjusted in accordance with the requirements of practice. The desired adjustment is retained by subsequently locking the adjusting ring 312 on the hub 284 of the ring gear 283 in the manner as described above.

The knife adjusting ring 312 and the ring gear 283 are retained in assembled position by means of the annular thrust or ring bearing 277 previously referred to. This thrust bearing is secured to the ring bearing 276 by screws 326 (Figs. 11, 12, 14 and 17) while set screws 327 (Figs. 11 and 14) are employed to maintain a proper spacing between the ring bearings 276 and 277 to assure free rotation of the ring gear 283 and the knife adjusting ring 312 therein. A radially extending oil passage 328 is provided in the ring bearing 276 to permit lubrication of the interior bearing surfaces of the mechanism.

Secured to the rear of the cutting head 36 by the heads 329 of the screws 288 previously referred to is a bevelled knife retaining ring 331 (Figs. 12, 15 and 17). In attaching the ring, the same is so positioned that the heads 329 of the screws 288 enter into the circular portion 332 of curved slots 333 in the ring 331 and engage over shoulders 334 when the ring 331 (Fig. 15) is rotated clockwise. A removable retaining plate 335 placed in one of the slots 333 and secured to ring 331 by a screw 335a bears against the head 329 of the screw 288 in such slot and locks the ring 331 against rotation with respect to the screws 288 so that the ring 331 is firmly held in place.

Secured to the rear face of the equalizing ring 306 adjacent its periphery by means of screws 336 (Figs. 12, 15 and 17) are a plurality of wedges or gauge blocks 337, three of these being provided in the illustrated embodiment and each having a tapered side surface 338 extending into a slot 341 of the equalizing ring 306. These blocks 337 project from the rear face 342 of the equalizing ring 306 beyond the rear side 343 of the retaining ring 331 through cut out portions 344 in the same (Fig. 15).

Slidably mounted on three pins 346 secured to and rearwardly projecting from the retaining ring 331 is an annular pressure plate 347 (Fig. 21) which is rotatably received within the channel of the semi-circular bearing 234 of the pressure plate support 233 previously referred to herein. The pins 346 extend through holes 348 (Figs. 3, 13, 15 and 21) in the pressure plate 347 and are of sufficient length so as to retain the pressure plate in its proper position during its range of movement axially of the head 36 more specifically referred to later on.

Secured to the front side 351 of the pressure plate 347 by means of screws 352 are stop blocks 353 corresponding in number to the blocks 337. Each block 353 is provided with a tapered side face 354 (Figs. 12, 17 and 21). The blocks 337 and 353 are arranged in opposing pairs with the tapered side faces of opposing blocks in contact with each other as clearly shown in Figs. 12, 15, 16 and 17.

The ring bearings 276 and 277 (Figs. 2, 11 and 13) are provided with complementary cut out portions 356 and 357 respectively forming an opening 358 through which the gear 38 (Fig. 2) extends into intermeshing engagement with the ring gear 283 so that upon rotation of the shaft 31 the ring gear 283 is driven thereby. A key 359 (see Fig. 2) secured to the housing 3 and engaging a slot 359a in the bearing ring 276 prevents rotation of the ring bearing 276 relative to the housing 3 and serves to position the cutting head 36.

The mechanism of the scraping head 37, which is provided with scraping knives 246, is driven by the gear 39, previously referred to, intermeshing with a ring gear 361 of the scraping head structure 37 in a similar manner as previously described herein in connection with ring gear 283 and gear 38. The head 37 is of the construction and operates in the same manner as the scraping head disclosed and described in my U. S. Letters Patent No. 2,323,092, dated June 29, 1943. Since the scraping head 37 does not form a part of the present invention, a further description of the same is not deemed necessary, as reference may be had to the patent referred to above for a complete understanding of the structure and operation of the same.

Operation

In the operation of the machine of the present invention the lever 23 is shifted in the direction of arrow 450 (Fig. 1) whereby the drive belt (not shown) is shifted from the idler pulley 16 upon the drive pulley 14 causing rotation of the same and shaft 13 as well as pulley 33 in the direction of arrows 451 (Figs. 1 and 2). The rotation of shaft 13, which is operatively connected with the feed roll shafts 71 to 84 by means of worm gearings 98 and shafts 93 and 94, causes rotation of the shafts 71 to 84 and the feed rolls 53, 54, gauge rolls 56, 57, feed rolls 61, 62 and discharge rolls 66 and 67 in the directions indicated by arrows 452 and 453 in Fig. 3. The rotation of pulley 33 in the direction of arrow 451 (Fig. 2) effects rotation of shaft 31 and gears 38 and 39 in the direction of arrow 454 so that the ring gears 283 and 361 of the cutting and scraping heads 36 and 37, which intermesh with gears 38 and 39, are rotated in a counterclockwise direction, viewed from the front end of the machine, as indicated by arrow 456 in Fig. 2, or in a clockwise direction, viewed from the rear end of the machine, as indicated by arrow 456 in Fig. 15.

When the machine is empty, i. e., no ears of corn are passing through the same, all of its parts are in the positions shown in Fig. 3. In other words, the feed rolls 53, 54, gauge rolls 56, 57, feed rolls 61, 62 and discharge rolls 66 and 67 are held in their closest position with respect to each other by the action of coil springs 118 and 121. The gauge plate 151 and control rod 146 are in their rearmost position while the cross bar 217, the actuating rods 223 and 224, the pressure plate support 233 and pressure plate 347 are in their foremost positions in which they are normally held by the action of coil spring 196 which bears against the rocker arm 174 which in turn is operatively connected with the control rod 146 and the cross bar 217 in the manner previously described herein.

The cutting and scraping heads 36 and 37 are rotated at a comparatively high speed, for instance 1,200 R. P. M., so that the knives 242 of the cutting head 36 are under the influence of centrifugal forces which tend to open them against the comparatively slight resistance of the coil springs 315.

However, when no ear is passing between the rolls 56, 57, the pressure plate 347 is held in its foremost position, as shown in Fig. 3, by the pressure plate support 233 which is fixed to the actu-

ating rods 223 and 224 also held in their foremost position by the action of spring 196, as previously stated herein since the centrifugal forces acting upon the knives 242 are insufficient to overcome the force of this spring.

When the pressure plate is in this foremost position and while the same rotates in the bearing 234 of the pressure plate support in unison with the retaining ring 331, knives 242, adjusting ring 312 and ring gear 283, (by reason of the driving connection between the retaining ring 331 and the pressure plate 347 by means of the pins 346), the pressure plate 347 is in its closest position with respect to the equalizing ring 306, and the tapered faces 354 and 338 of the stop blocks 353 and blocks 337, respectively are in engagement with each other so that the equalizing ring 306 is rotated in unison with the ring gear 283, adjusting ring 312 and knives 242 and is held against relative movement with respect to the same.

Therefore, the equalizing ring 306, when viewed from the rear of the machine (see Fig. 15) is locked against rotation in a clockwise direction with respect to the adjusting ring 312 and ring gear 283 and since the knife control pins 304 extend through holes in the equalizing ring 306 and are firmly held thereby, the knives 242 which engage the heads 303 of the pins 304 are held in their closed position and cannot open under the centrifugal forces acting upon the same.

While the various parts of the machine are in the positions as above described and shown in Fig. 3 the husked ears of corn to be treated are now successively deposited by the operator into the feed trough 42 with their axes parallel to the same and are successively advanced by the feed chain 43, which is continuously driven during the operation of the machine in the manner as previously explained herein, toward the first pair of feed rolls 53 and 54 and introduced between the same. As soon as the front end of an ear enters between these cooperating feed rolls and contacts the same the rolls 53 and 54, which rotate in opposite directions, as indicated by arrows 452 and 453 in Fig. 3, grip the ear and advance it therebetween in the direction of arrow 460 into contact with the feed or gauge rolls 56 and 57.

The feed rolls 56 and 57 grip the ear and advance it therebetween in the direction of arrow 460 (Fig. 3) through the cutting head 36, i. e., the feed rolls 56 and 57 introduce the front end of the ear between the cutting edges 279 of knives 242 of the cutting head 36 and into engagement with the feed rolls 61 and 62. The feed rolls 61, 62 in turn grip the ear and advance it through the scraping head 37 past the scraping blades 246 into engagement with the feed or discharge rolls 66 and 67 which feed the cob through opening 68 in the housing 3 into the discharge chute 69 which finally discharges the cob from the machine.

As the ear enters between opposing cooperating rolls 53, 54; 56, 57; 61, 62; 66, 67 it spreads the same apart against the tension of the coil springs 118 and 121 while the feed roll shafts 77, 78; 79, 80; 81, 82; and 83, 84; respectively, supporting the feed rolls, are likewise moved apart and pivot about their universal joints 92 previously referred to herein. It should further be noted that all of the feed rolls are so constructed and arranged with respect to each other as to align the ear of corn with its axis coincident with the axis 143 of the heads 36 and 37 (Fig. 3) and to maintain the ear in such alignment and to prevent rotation of the ear about its own axis during its travel through the machine.

As soon as the front end of the ear of corn enters between the feed or gauge rolls 56 and 57 the same, as well as their shafts 79 and 80, begin to spread apart in the directions of arrows 461 (Fig. 10) and the sleeves 156 and 157 (Figs. 3, 9 and 10) carried by these shafts engage the inclined cam faces 158 and 159, respectively, of the gauge plate 151 with a resulting camming action which forces the gauge plate 151 and control rod 146 forwardly in the direction of arrow 462 (Figs. 3 and 10). The amount of spreading movement of the gauge rolls 56, 57, sleeves 156, 157 and shafts 79 and 80 depends upon the size, i. e., the maximum outside diameter of the ear passing between the gauge rolls 56 and 57, and the amount of forward movement of the gauge plate 151 and control rod 146 is therefore in direct proportion to the maximum diameter of the ear.

When the gauge plate 151 and control rod 146 move in the direction of arrow 462 (Figs. 3 and 10) the rocker arm 174, pivotally connected to the control rod 146 and the cross bar 217 in the manner previously referred to herein, is rocked about its pivot 172 in the direction of arrow 464 (Fig. 3) against the tension of the coil spring 196 thereby causing rearward movement of the cross bar 217, actuating rods 223 and 224, pressure plate support 233, pressure plate 347 and stop blocks 353 in the direction of arrow 466 (Figs. 3, 12 and 17) whereby the pressure plate is withdrawn rearwardly from its position shown in Fig. 17 to the position illustrated in Fig. 12.

As soon as the pressure plate 347 and the stop blocks 353 are retracted in the direction of arrow 466 (Figs. 3 and 17) the stop blocks 353 move away from the blocks 337 so that the inclined face 354 of each stop block tends to disengage from the inclined face 338 of the block 337 cooperating therewith. As soon as this happens the pressure between the stop blocks 353 and the blocks 337, which held the cutting knives 242 of the cutting head 36 closed against the action of the centrifugal forces as previously explained herein, is released and the cutting knives 242 open in iris fashion under the action of the centrifugal force exerted upon the same during the rapid rotation of the cutting head 36.

In other words, the cutting knives 242 rotate about their pivot pins 288 (Fig. 15) in a clockwise direction, as illustrated by arrow 467, so that the equalizing ring 306 is rotated in a clockwise direction, as indicated by arrow 468 in Fig. 15, relative to the pressure plate 347 and the blocks 337 follow the stop blocks 353 and actually remain in contact with each other while the pressure plate 347 is retracted and the cutting knives open in the manner explained herein.

Consequently when the gauge rolls 56 and 57 are spread apart by the ear of corn passing between the same the gauge plate 151, control rod 146, rocker arm 174, cross bar 217, actuating rods 223, 224, pressure plate support 233, pressure plate 347 and stop blocks 353 are operated in a manner as above described and are shifted a distance in direct proportion to the maximum diameter of said ear of corn. Therefore, the equalizing ring 306 is permitted to rotate in clockwise direction (Fig. 15) relative to ring gear 283 under the action of the knives 242 as they open in iris fashion under the centrifugal forces act-

ing upon the same until the blocks 337 and equalizing ring 306 are again held against relative movement with respect to the ring gear 283 and pressure plate 347 by the stop blocks 353 carried thereby.

When the knives 242 of the cutting head 36 open in the manner as above described they are accurately set in direct cutting relation with respect to the ear and when the latter enters between the whirling cutting knives 242 and passes therebetween the kernels of the ear of corn are cut from the ear along the cob line thereof and are discharged downwardly in the direction of arrow 469 (Fig. 3) from the machine into a collecting chute or the like, not shown.

After the rear end of the ear of corn passing through the cutting head 36 disengages from the gauge rolls 56 and 57 immediate closing of the cutting knives 242 is prevented since the horizontal portions 293 thereof form shoes which engage and ride along the cob until the cob leaves the knife during its travel toward the discharge end of the machine.

As previously stated herein, the cob of the ear of corn passing through the cutting head 36 is received between the feed rolls 61 and 62 which feed it into the scraping head 37 provided with scraping blades 246 which exert a scraping action upon the cob and remove any remaining kernel portions or creamy corn juices therefrom which are discharged downwardly between the cutting heads 36 and 37 into a separate discharge chute or the like and may be used for cream style corn. The head 37 may be removed from the machine entirely and the machine operated without it whenever desired, as for example, when whole grain style corn is to be cut and scraping is not required.

As previously stated, the construction and operation of the scraping head 37 does not form a part of the present invention and no further description of the same is therefore given herein.

The cob which passes through the scraping head 37 is finally received between the discharge rolls 66 and 67 and is discharged therebetween into the discharge chute 69 and is discharged thereby from the machine.

While in the foregoing the complete operation of the machine with respect to one ear of corn has been given it is to be understood, however, that the operation of the machine repeats in the same manner as set forth herein with respect to each ear of corn entering the machine and the amount of opening of the knives of the cutting head 36 is always controlled by the gauge rolls 56 and 57, which act as outside gauges traveling along the kernel surface of the ear so that the cutting position is regulated for each individual ear passing through the machine. Thus the depth of cut is maintained constant for all ears irrespective of variations in their sizes.

As soon as an ear of corn has passed the gauge rolls 56 and 57 the latter as well as the sleeves 156 and 157 are returned to their original or closely spaced position (see Fig. 3) by the action of the coil springs 118 and 121 and therefore when the ear subsequently leaves the cutting head 36 the knives 242 will close since the gauge plate 151, control rod 146, rocker arm 174, cross bar 217, actuating rods 223, 224, pressure plate support 233, pressure plate 347 and stop blocks 353 are then returned to their original positions under the action of the coil spring 196 which, as previously stated herein, is of sufficient strength to overcome the action of the centrifugal forces acting upon the knives 242 during rotation of the cutting head 36.

The closing action of the cutting knives 242 is due to the fact that upon the return movement of the pressure plate 347 and stop blocks 353 in the direction of arrow 471 from the position in Fig. 12 to the position in Fig. 17 under the pressure of spring 196 these blocks 353 exert a camming action upon the blocks 337 causing rotation of the equalizing ring 306 in a counterclockwise direction (Fig. 15) with respect to the pressure plate 347 i. e. in an opposite direction as indicated by arrow 468 in Fig. 15 so that the knives 242 due to their pin and slot connection 303, 301 with the equalizing ring 306 are rotated counterclockwise (Fig. 15) about their pivot pins 288 and close in iris fashion against the centrifugal forces acting upon the same. The closing of the knives is completed when the gauge plate 151 contacts the portion 472 of the housing 3 (Fig. 3) and further forward movement of the pressure plate 347 and the stop blocks 353 carried thereby is arrested. The knives will open again, however, as described herein, when the next ear of corn enters between the gauge rolls 56 and 57.

However, when a succeeding ear of corn enters between these gauge rolls 56 and 57 at the moment the preceding ear leaves the knives 242 of the cutting head 36 the knives 242 will only slightly close and open again, or may not close at all, or may open more, depending upon the outside diameter of the next ear of corn now between the gauge rolls 56 and 57 and how closely it follows the preceding ear since this next or succeeding ear now controls the positioning of the knives 242 according to its outside diameter, i. e., the kernel line thereof.

The correct closing operation of the knives 242 depends upon the coil spring 196 which is assisted by the action of springs 315 to a considerable extent. Therefore it may be necessary to adjust the tension of the spring 196 from time to time and this is easily accomplished by turning the screw 193 in one or the other direction.

In practice it may become necessary to vary the depth of cut of the cutting knives 242 for different types of corn to be handled by the machine or for different styles of cut. Since the depth of cut of the cutting knives 242 is controlled by the position of the pressure plate 347 and the stop blocks 353 carried thereby with respect to the blocks 337 on the equalizing ring 306 it is therefore necessary to shift the pressure plate 347 toward or away from the equalizing ring 306 to effect an adjustment in the depth of cut of the cutting knives of the machine. This adjustment of the pressure plate 347 is obtained by loosening the lock nut 218 and by rotating the adjusting nut 212 in one or the other direction whereby the position of the cross bar 217, actuating rods 223, 224, pressure plate 347 and stop blocks 353 with respect to the control rod 146 and gauge plate 151 is varied. This adjustment shifts the stop blocks 353 toward or away from the blocks 337 so that the amount of opening of the knives 242 with respect to a certain spread apart position of the gauge rolls 56, 57 and therefore with respect to the diameter of an ear of corn passing therebetween, is changed. When the knives are adjusted for the desired depth of cut the lock nut 218 is tightened against the adjusting nut 212 so that the adjustment is maintained during the operation of the machine.

From the foregoing description it will therefore be observed that in the construction of the pres-

ent invention the knives are not positively opened by the gauge rolls as has been the practice heretofore but fly open of their own accord, to the extent permitted by the stops, under the action of the centrifugal forces thereon during rapid rotation of the cutting head. Therefore the excessive wear of the knife control and actuating mechanism present in the prior art machines, wherein the knives are positively opened by the gauge rolls, and due to the great amount of force needed to open the knives has been eliminated in the present construction since the knives open of their own accord and neither the action of centrifugal forces nor strong springs, or both, upon the knives has to be overcome in opening the same. Furthermore, in the present construction the opening of the knives is positively limited by the stops and therefore opening of the knives to a greater extent is prevented.

I desire to be understood that the invention is not limited to the particular application or precise details of construction illustrated but that various applications, modifications and variations may be resorted to without departing from the spirit or scope of the invention and I deem myself entitled to all such applications, modifications and variations as come within the scope of the claims appended hereto.

Having thus described my invention and the manner in which it may be used what I claim to be new and desire to protect by Letters Patent is:

1. A green corn cutting apparatus comprising a rotary knife carrier, a kernel cutting knife mounted on said carrier for movement away from the axis of rotation of the carrier under the influence of centrifugal force, gauging means mounted in advance of said knife for engagement with the surface of an ear of corn delivered endwise to said cutting knife, and means operable by said gauging means to limit the amount of movement of said knife under the influence of centrifugal force in accordance with the diameter of the ear.

2. A green corn cutter comprising a rotary knife carrier having a central opening for passage of ears of corn endwise therethrough, a rotary kernel cutting knife carried by said carrier and movable toward and away from the axis of said opening, means for rapidly rotating the carrier for moving the knife by centrifugal force to ear receiving and kernel cutting position, and means for limiting the amount of movement of the knife under the action of the centrifugal force in predetermined relation to the diameter of each ear passing through said opening.

3. A green corn cutter comprising a rotary cutting head having a central opening forming a passage for ears of corn endwise therethrough, a kernel cutting knife carried by the head for rotation therewith and movable toward and away from the axis of said head, means for rapidly rotating the cutting head for moving the knife by centrifugal force only away from said axis to ear receiving and kernel cutting position, means for feeding an ear endwise through said passage past said knife whereby the kernels are cut from the ear by the knife, and means for limiting the amount of movement of the knife under the influence of centrifugal force away from said axis in predetermined relation to the diameter of each ear presented to the knife.

4. A green corn cutting apparatus comprising a rotary knife carrier having a central opening therein to permit ears of corn to be passed endwise therethrough, a kernel cutting knife movably secured to said carrier at such a point with respect to the mass of the knife that centrifugal force acting upon the knife urges its cutting edge away from the axis of said opening when the carrier is rotated, gauging means mounted in advance of said knife for engagement with the surface of an ear of corn delivered endwise to the knife, and means operable by said gauging means to normally hold said knife against movement away from said axis, to release the knife upon engagement of the ear with the gauging means for movement of the knife away from said axis under the influence of centrifugal force and to limit the amount of movement of the knife under the influence of centrifugal force away from said axis in accordance with the diameter of the ear.

5. A green corn cutting apparatus comprising a rotary knife carrier having a central opening therein to permit ears of corn to be passed endwise therethrough, a kernel cutting knife movably secured to said carrier at such a point with respect to the mass of the knife that centrifugal force acting upon the knife urges its cutting edge away from the axis of said opening when the carrier is rotated, stop means for normally preventing the knife from moving away from said axis, and gauge means operatively associated with said stop means to shift it in accordance with the diameter of the ear and release the knife for movement away from said axis under the action of centrifugal force to a point determined by the size of the ear.

6. A green corn cutter comprising a rotary cutting head having an opening concentric to the axis of rotation of the head for passage of ears of corn endwise therethrough, a kernel cutting knife carried by the head for rotation therewith and extending into said opening, said knife being movable toward and away from the axis of rotation of the head, means for rapidly rotating the cutting head for moving the knife by centrifugal force only to ear receiving and kernel cutting position, means for feeding an air endwise through said opening past said knife whereby the kernels are cut from said ear by the knife, and means for limiting the amount of movement of the knife away from said axis under the action of the centrifugal force in relation to the diameter of each ear presented to the knife.

7. A green corn cutter comprising a rotary knife carrier having an opening concentric to its axis of rotation for passage of ears of corn endwise therethrough, a kernel cutting knife carried by the carrier for rotation therewith and movable toward and away from the axis of rotation of said carrier, means for rapidly rotating the carrier for moving the knife by centrifugal force only away from said axis to ear receiving and kernel cutting position, means for feeding an ear endwise through said opening into cutting engagement with said knife, and means for limiting the amount of movement of the knife under centrifugal force away from said axis in predetermined relation to the diameter of each ear presented to the knife.

8. A green corn cutter comprising a rotary cutting head having a passage for ears of corn, a kernel cutting knife pivotally mounted on the head for rotation therewith and radial movement relative thereto, said knife extending into said passage, means for rapidly rotating the cutting head for moving causing radial movement of the knife by centrifugal force to ear receiving and kernel cutting position, means for feeding an ear

longitudinally through said passage past said knife whereby the kernels are cut from the ear by the knife, and means for limiting the amount of radial movement of the knife by centrifugal force to cutting position in predetermined relation to the diameter of each ear presented to the knife.

9. A green corn cutter comprising a knife rotatable about a fixed axis and movable toward and away from said axis, means for feeding ears of corn along said axis past said knife and for preventing rotation of the ears during advancement thereof, said feeding means including a gauging device for measuring the outside diameter of each ear of the corn advancing toward said knife, means for rapidly rotating the knife whereby the knife is subjected to centrifugal force tending to move it away from said axis, means normally holding the knife in close relation to said axis, and means operable by said gauging device to actuate said holding means to release said knife for free movement away from said axis under the influence of centrifugal force only to a cutting position determined by the diameter of the ear of corn presented thereto.

10. A green corn cutting apparatus comprising a rotary knife carrier journalled for rotation about an axis and having a central opening therein to permit ears of corn to be passed endwise therethrough, a plurality of kernel cutting knives carried by said carrier for rotation therewith and positioned to shear kernels from the ears of corn passed through said opening, said knives being mounted for movement toward and away from the axis of said opening and having their weight so distributed that centrifugal force urges them toward open position during rotation of said carrier, a stop for normally preventing the knives from flying open, and gauge means to shift the stop in accordance with the diameter of the ear passing through the opening whereby to permit the knives to fly open under the influence of centrifugal force only to a point determined by the size of the ear.

11. A green corn cutter comprising a knife rotatable about a fixed axis and movable toward and away from said axis, means for feeding ears of corn successively along said axis past said knife and for preventing rotation of the ears during advancement thereof, said feeding means including a gauging device for measuring the outside diameter of each ear of the corn advancing toward said knife, means for rapidly rotating the knife whereby the knife is subjected to centrifugal force tending to move it away from said axis, means normally holding the knife in close relation to said axis, means operable by said gauging device to actuate said holding means to release said knife for free movement away from said axis under the influence of centrifugal force to a cutting position determined by the outside diameter of the ear of corn presented thereto, and means associated with the holding means for adjusting the cutting position of the knife.

12. A green corn cutter comprising a rotary cutting head having a central passage for ears of corn, a rotary kernel cutting knife radially movable toward and away from the axis of rotation of said head, means for rapidly rotating the knife, means normally holding said knife in a predetermined position relative to said axis against the centrifugal force acting upon the knife during the rapid rotation thereof, means for feeding an ear endwise through said passage past said knife and for gauging the diameter of said ear, and means operated by the gauging means for operating said holding means to release the knife for free movement away from said axis under the action of centrifugal force to an ear receiving and kernel cutting position in predetermined relation to the diameter of each individual ear presented to the knife.

13. A green corn cutter comprising a cutting head having a passage for ears of corn, a rotary kernel cutting knife extending into said passage and radially movable relative thereto, means for rapidly rotating the knife, means normally holding said knife in a predetermined radial relation relative to the head against the centrifugal force acting upon the knife during the rapid rotation thereof, means for feeding an ear endwise through said passage past said knife and for gauging the diameter of said ear, and means for operating said holding means and operable by said gauging means for releasing the knife for free radial movement thereof relative to the passage of the head under the action of centrifugal force to ear receiving and kernal cutting position and for limiting the amount of radial movement of the knife in predetermined relation to the diameter of each individual ear presented to the knife.

14. A green corn cutter comprising a rotary cutting head having a central opening forming a passage for ears of corn therethrough, a kernel cutting knife carried by the head for rotation therewith extending into said passage and radially movable inwardly and outwardly relative thereto, means for rapidly rotating the cutting head and knife, means normally holding the knife inwardly in a predetermined position in said passage against the action of centrifugal force tending to move the knife outwardly during rapid rotation thereof, means for gauging the diameter of an ear and for feeding the ear endwise through said opening and past said knife, and means actuated by said gauging means for operating said holding means to release the knife for free outward movement under the action of the centrifugal force to an ear receiving and kernal cutting position depending upon the diameter of the ear.

15. A green corn cutter comprising a rotary knife carrier having an opening concentric to its axis of rotation for passage of ears of corn therethrough, a kernel cutting knife carried by said carrier and movable toward and away from said axis, means for rapidly rotating the carrier and knife, a pair of opposed power driven feed rolls in front of the carrier for feeding an ear of corn therebetween endwise into the opening of the carrier past said knife, said rolls being movably mounted to be spread apart by the ear passing therebetween, means normally holding the knife in its inward position toward said axis against the action of the centrifugal force tending to move the knife outwardly away from said axis during rapid rotation of the head and knife, and means cooperating with the feed rolls and holding means for actuating the holding means to release the knife for movement away from said axis under the action of the centrifugal force only to an ear receiving and kernel cutting position in predetermined relation to the spread apart position of the feed rolls.

16. A green corn cutter comprising a rotary cutting head having an opening concentric to the axis of rotation of the head for passage of ears of corn therethrough, a kernel cutting knife extending into the opening and movable inwardly and outwardly therein, means for rapidly rotat-

ing the head and knife, a pair of opposed power driven feed rolls in front of the head for receiving an ear of corn therebetween and for feeding the ear endwise into the opening of the head past said knife, movable means supporting the rolls for movement apart from each other as the ear passes therebetween, means normally holding the knife in a predetermined inward position in said opening against the centrifugal force tending to move the knife outwardly in said opening during the rapid rotation of the head, and actuating means operable by said movable roll supporting means for operating the holding means to release the knife for free outward movement under the action of the centrifugal force only to a predetermined position in proportionate relation to the spread apart position of the feed rolls.

17. A green corn cutter comprising a rotary cutting head having a central opening forming a passage for ears of corn therethrough, a kernel cutting knife carried by the head for rotation therewith extending into said passage and radially movable inwardly and outwardly relative thereto, means for rapidly rotating the cutting head and knife, means normally holding the knife inwardly in a predetermined position in said passage against the action of centrifugal force tending to move the knife outwardly during rapid rotation thereof, means for gauging the diameter of an ear and for feeding the ear longitudinally through said opening and past said knife, means actuated by said gauging means for operating said holding means to release the knife for free outward movement under the action of the centrifugal force only to an ear receiving and kernel cutting position in predetermined relation to the diameter of said ear, and means associated with the cutting head and cooperating with the knife for adjusting the inward position thereof.

18. A green corn cutter comprising a rotary cutting head having a central opening forming a passage for ears of corn therethrough, a kernel cutting knife carried by the head for rotation therewith extending into said passage and radially movable inwardly and outwardly relative thereto, means for rapidly rotating the cutting head and knife, means normally holding the knife inwardly in a predetermined position in said passage against the action of centrifugal force tending to move the knife outwardly during rapid rotation thereof, means for gauging the diameter of an ear and for feeding the ear endwise through said opening and past said knife, means actuated by said gauging means for operating said holding means to release the knife for free outward movement under the action of the centrifugal force to an ear receiving and kernel cutting position depending upon the diameter of the ear, and means associated with the holding means for varying the kernel cutting position of the knife with respect to the diameter of the ear.

19. A green corn cutter comprising a knife rotatable about a fixed axis and movable toward and away from said axis, opposing feed rolls for feeding an ear of corn along said axis, means mounting the rolls for movement toward and away from each other, resilient means for urging the rolls toward each other, means for rotating the rolls in opposite directions for receiving an ear presented thereto therebetween and for advancing it longitudinally along said axis past said knife whereby said rolls are spread apart a distance corresponding to the diameter of the ear, means for rapidly rotating the knife, means for holding the knife in a position close to said axis against the action of the centrifugal force tending to move the knife away from the axis during rapid rotation of the knife, and means cooperating with said feed rolls for actuating said holding means to release the knife for free movement under centrifugal force away from the axis to a cutting position determined by the diameter of the ear presented to the knife by said rolls.

20. A green corn cutter comprising a rotary cutting head having an opening concentric to the axis of rotation of the head for passage of ears of corn therethrough, a kernel cutting knife extending into the opening and movable inwardly and outwardly therein, means for rapidly rotating the head and knife, a pair of opposed power driven feed rolls for receiving an ear of corn therebetween and for feeding the ear endwise into the opening of the head past said knife, movable means supporting the rolls for movement apart from each other as the ear passes therebetween, means including a spring normally holding the knife in a predetermined inward position against the centrifugal force tending to move the same outwardly in said opening during the rapid rotation of the head, actuating means operable by said movable roll supporting means for operating the holding means against the action of the spring thereof to release the knife for outward movement under the action of the centrifugal force to a predetermined position in proportionate relation to the spread apart position of the feed rolls, and means for returning the feed rolls toward each other to discontinue the operation of the actuating means by the roll supporting means when the ear has passed said rolls and to effect return of the knife to its inward position against the centrifugal force under the action of the spring of said holding means.

21. A green corn cutter comprising a cutting head having a central opening for passage of ears of corn therethrough, a plurality of kernel cutting knives pivotally mounted on said head, said knives being radially arranged to open and close in iris fashion, means for rapidly rotating the head and knives whereby the knives are subjected to centrifugal forces tending to open the same, means normally holding the knives closed against the action of the centrifugal forces, means for feeding ears of corn endwise and successively through said opening past said knives and for gauging the diameter of each ear presented to the knives, and means operated by said feeding means for actuating said holding means to release said knives to freely open under the action of the centrifugal forces only to an ear receiving and cutting position in predetermined relation to the diameter of each ear presented to said knives.

22. A green corn cutter comprising a cutting head having a central opening for passage of ears of corn therethrough, a plurality of kernel cutting knives pivotally mounted on said head, said knives being radially arranged to open and close in iris fashion, means for rapidly rotating the head and knives whereby the knives are subjected to centrifugal forces tending to open the same, means normally holding the knives closed against the action of the centrifugal forces, a pair of opposed oppositely driven feed rolls for receiving an ear of corn and for feeding if therebetween endwise into the opening and past said knives, said rolls being movably mounted to be

spread apart by the ear passing therebetween, and means for actuating the holding means by the spreading movement of the feed rolls to release the knives to open freely under the action of the centrifugal force to a predetermined cutting position with respect to said ear.

23. A green corn cutter comprising a rotary knife carrier having a central opening for passage of ears of corn therethrough, a plurality of kernel cutting knives movably mounted on said carrier for rotation therewith about an axis, said knives being radially arranged to open and close in iris fashion, means for rapidly rotating the carrier and knives whereby the knives are subjected to centrifugal forces opening the same, a pair of opposed spreadable feed rolls for receiving an ear and for feeding it therebetween endwise through the opening in the carrier past said knives whereby the rolls are spread apart according to the diameter of the ear, means for releasing the knives for free opening thereof under the action of the centrifugal forces only and for limiting their opening in proportion to the amount of spreading of the rolls, and means for closing the knives against the action of the centrifugal forces after the ear has passed between said rolls.

24. A green corn cutter comprising a cutting head having a central opening for passage of ears of corn therethrough, a plurality of kernel cutting knives pivotally mounted on said head for rotation therewith, said knives being radially arranged to open and close in iris fashion, means for rapidly rotating the head and knives whereby the knives are subjected to centrifugal forces opening the same, a pair of opposed power driven spreadable feed rolls for receiving an ear and for feeding it therebetween through the opening in the head past said knives, whereby the rolls are spread apart according to the diameter of the ear, means cooperating with said feed rolls for releasing the knives to cause them to fly open under the action of the centrifugal forces only and to limit their opening in proportion to the amount of spreading of the rolls, and resilient means for automatically closing the knives against the action of the centrifugal forces after the ear has passed between said rolls.

25. A green corn cutter comprising a cutting head having a central opening for passage of ears of corn therethrough, a plurality of kernel cutting knives pivotally mounted on said head for rotation therewith, said knives being radially arranged to open and close in iris fashion, means for rapidly rotating the head and knives whereby the knives are subjected to centrifugal forces tending to open the same, an equalizing ring mounted on said head for rotation therewith and rotatable with respect thereto, means operatively interconnecting said equalizing ring with said knives for effecting equalized opening and closing movement of the knives upon relative movement of said ring with respect to said head, a gauge block having inclined face on said ring, an annular pressure plate adjacent said head connected with said head for rotation therewith and axially movable with respect thereto, a stop block on said plate having an inclined face for engaging the inclined face of said gauge block, means for normally holding the plate and stop block in a predetermined position with respect to said equalizing ring and gauge block with the inclined faces of said blocks in contact with each other, whereby the equalizing ring is held against relative movement with respect to said head to prevent opening of the knives under the action of the centrifugal forces, means for feeding an ear of corn longitudinally through the opening of said head past said knives and for gauging the diameter of said ear, and means actuated by said gauging means for moving said plate and stop block axially of said head to release said gauge block and equalizing ring for limited rotation with respect to said head, pressure plate and stop block under the action of the centrifugal forces upon said knives to permit opening of the knives to a predetermined cutting position with respect to the ear as determined by said gauging means.

26. A green corn cutter comprising a cutting head having a central opening for passage of ears of corn therethrough, a plurality of kernel cutting knives pivotally mounted on said head for rotation therewith, said knives being radially arranged to open and close in iris fashion, means for rapidly rotating the head and knives whereby the knives are subjected to centrifugal forces tending to open the same, an equalizing ring mounted on said head for rotation therewith and rotatable with respect thereto, means operatively interconnecting said equalizing ring with said knives for effecting equalized opening and closing movement of the knives upon relative movement of said ring with respect to said head, a gauge block on said ring having an inclined face facing in the direction of rotation of said head, an annular pressure plate adjacent said head connected with said head for rotation therewith and axially movable with respect thereto, a stop block on said plate having an inclined face facing in a direction opposite to the direction of rotation of the head for engaging the inclined face of said gauge block, a spring for normally holding the plate and stop block in a predetermined position with respect to said equalizing ring and gauge block with the inclined faces of said blocks in pressure contact with each other whereby the equalizing ring is held against relative movement with respect to said head to prevent opening of the knives under the action of the centrifugal forces, means for feeding an ear of corn longitudinally through the opening of said head past said knives and for gauging the diameter of said ear, and means actuated by said gauging means for moving said plate and stop block axially of said head against the action of said spring to release said gauge block and equalizing ring for limited rotation with respect to said head, pressure plate and stop block under the action of the centrifugal forces upon said knives to permit opening of the knives to a predetermined cutting position with respect to the ear as determined by said gauging means.

CHARLES E. KERR.

CERTIFICATE OF CORRECTION.

Patent No. 2,386,955. October 16, 1945.

CHARLES E. KERR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 8, second column, line 30, claim 5, before the word "release" insert --to--; line 73, claim 8, strike out "moving"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of February, A. D. 1946.

Leslie Frazer
First Assistant Commissioner of Patents.

(Seal)