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Bakewell

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[54] **POWER GRINDER AND MIXER FOR FOODS**

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[51] **Int. Cl.**..... **B02c 18/30**

[58] **Field of Search**..... 241/101.6, 101.2, 101.5, 241/80, 82.6, 247, 248; 259/5, 9, 34, 105, 41

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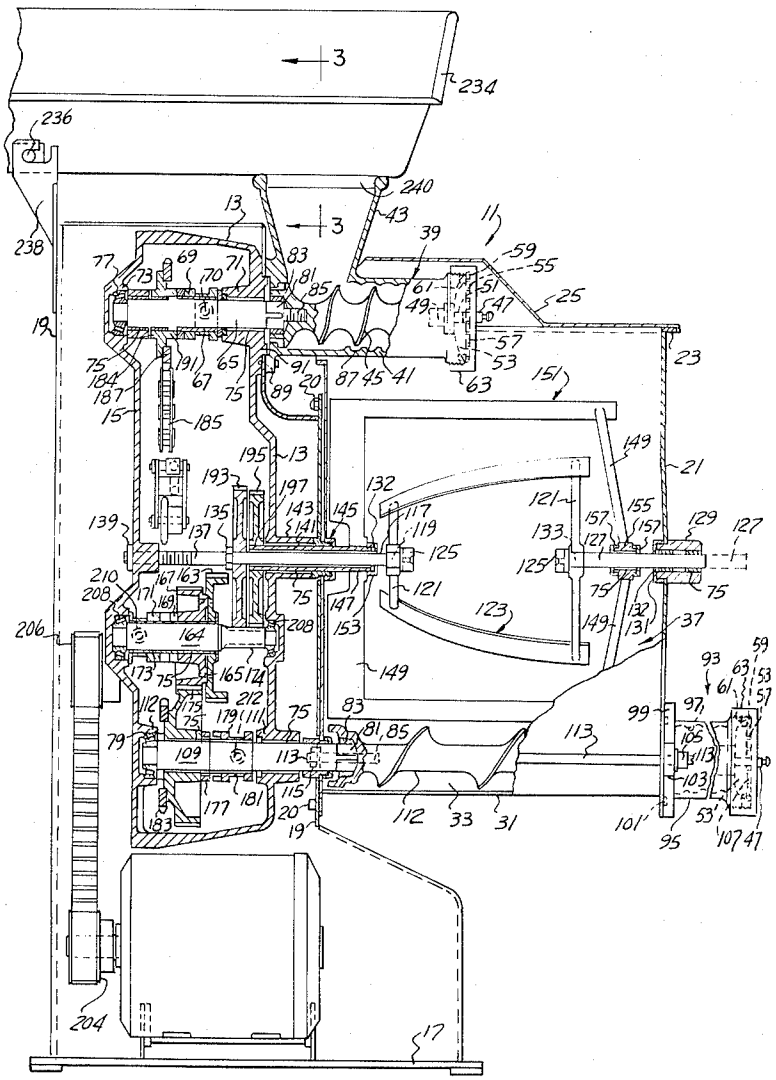
[57] **ABSTRACT**

A power operated food grinder and mixer has a base, a tank, and a gear box. An upper grinder head is mounted on the gear box for coarse grind and includes a hopper and a feed worm. An inner mixing paddle is mounted within the tank connected to a drive shaft for rotation in one direction, and an outer mixing paddle is mounted and journalled within said tank and secured to a power rotated sleeve, for rotation in the opposite direction. A feed channel at the bottom of the tank includes a feed worm, and a lower grinder head is mounted on the tank receiving said worm. The gear box includes a series of power rotatable shafts adapted for driving the feed worms, the drive shaft and sleeve. A series of independently operable clutches are provided for each of the said shafts in conjunction with a series of interconnected power driven gears, together with independent manual controls for each clutch for selective activation of the corresponding worms and mixing paddles for operation singly or in unison.

14 Claims, 5 Drawing Figures



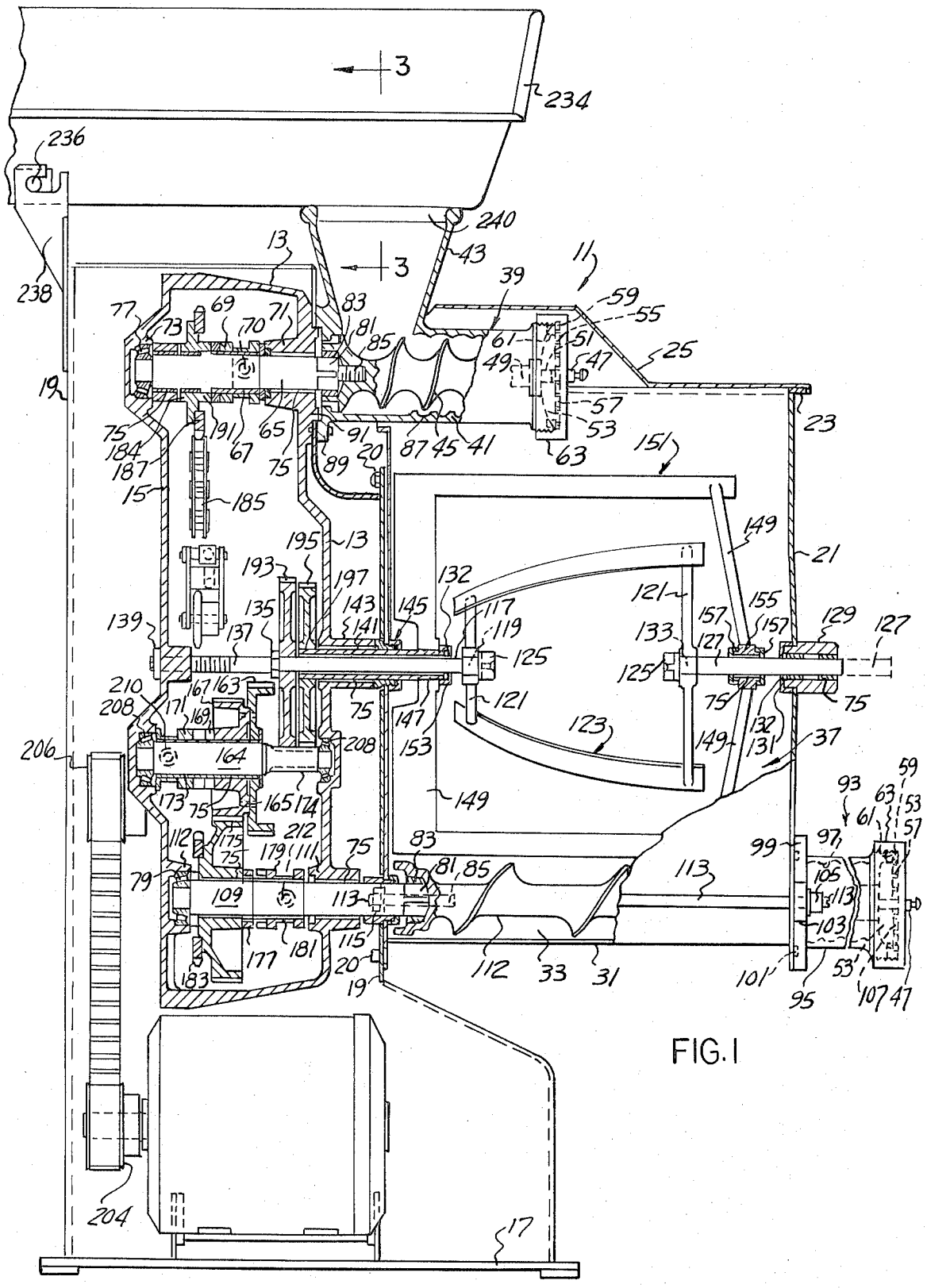

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FIG. 1

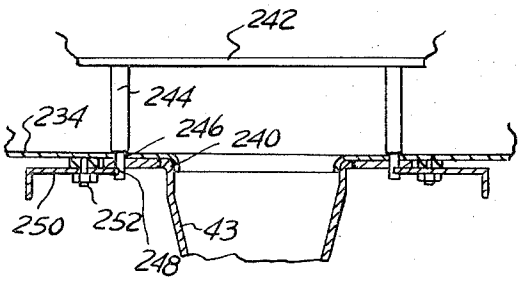


FIG. 3

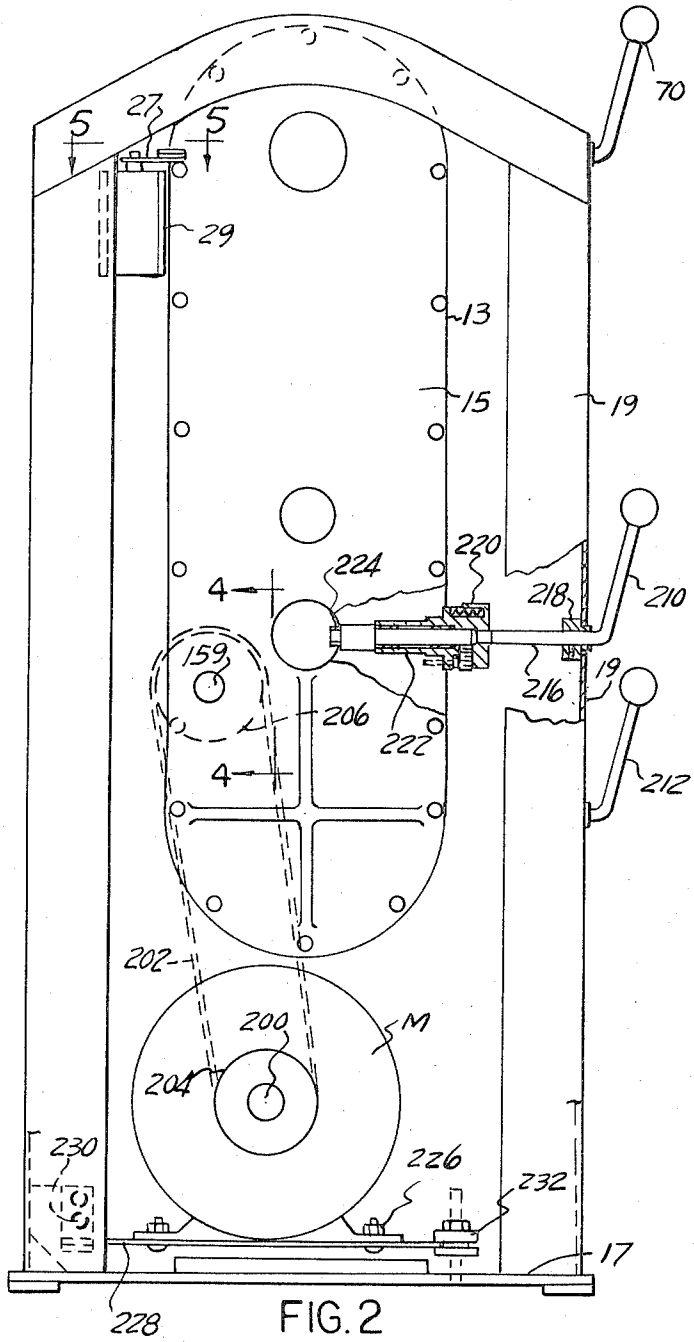
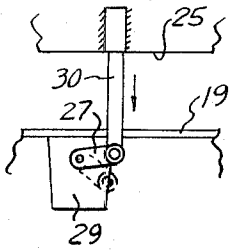


FIG. 2

FIG. 5



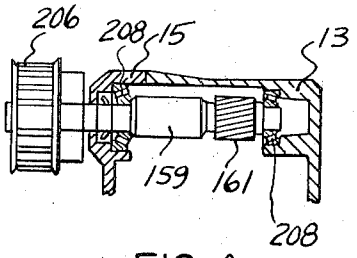


FIG. 4

POWER GRINDER AND MIXER FOR FOODS

BACKGROUND OF INVENTION

Heretofore, there have been provided on the market various devices for separately grinding and mixing foods including meat and, wherein, it was necessary to first provide a mechanism for coarse grinding and the transfer thereafter into a further grinding device for fine grinding and mixing.

Heretofore, there has been no compact machine to provide for overall grinding and mixing to achieve coarse and fine griding and mixing all in one operative service.

BRIEF DESCRIPTION OF THE INVENTION

It is an object of the present invention to provide a unified power operated grinder and mixer which will include a mixing tank with power rotated paddle blades therein, a first grinder head for a coarse grind of the food particles communicating with said tank and a second fine grinder head connected with the tank for receiving the mixed materials and for a further grinding thereof.

It is another object to provide an improved power transmission in conjunction with the said grinder and mixer and, wherein, a continuous drive is applied to a chain of gears adapted for connection to the respective shafts for the feed worms of said grinders and for the drive to the individual mixing paddles and, wherein, there are provided a series of separately operable spline clutches by which one or more or all of the respective grinder heads and mixing mechanisms may be energized.

These and other objects will be seen from the following specification and claims in conjunction with the appended drawings in which:

THE DRAWING:

FIG. 1 is a fragmentary partly broken away sectional view of the present grinder and mixer;

FIG. 2 is an end elevational view thereof with the loading tray removed;

FIG. 3 is a fragmentary section taken in the direction of arrows 3—3 of FIG. 1;

FIG. 4 is a fragmentary section taken in the direction of arrows 4—4 of FIG. 2;

FIG. 5 is a fragmentary section taken in the direction of arrows 5—5 of FIG. 2.

DETAILED DESCRIPTION OF INVENTION

Referring to the drawings, the present combination grinder mixer **11** includes an upright gear box **13** with corresponding gear box cover **15** mounted upon a support base **17** fragmentarily shown.

Upright column **19** upon the base is secured by fasteners **20** to and supports the upright stainless steel tank **21** having a peripheral top flange **23** adapted to receive safety cover **25.**

Spring biased arm **27** projects from the normally open safety switch **29** FIG. **5** upon the gear box in a motor circuit. The cover **25** properly assembled on the tank **21** has a rearwardly extending rod **30** which engages said arm to close said switch to the dotted line position permitting operation of the motor drive for the transmission within said gear box.

Elongated channel **31** of stainless steel, has an elongated bore **33** which communicates with the interior chamber **37** of said tank, at the bottom thereof.

UPPER GRINDER HEAD

The upper coarse grinder head **39** includes an elongated stainless steel body **41** having an outlet at one end and at its other end, an upright hopper **43.** Said head includes power rotated elongated stainless steel worm **45** for feeding materials through the grinder for delivery into chamber **37** of said tank.

Axially disposed replaceable journal **47** includes a boss **49** which is threaded into the outer end of feed worm **45** and includes square portion **51** and outwardly thereof, a cylindrical portion which is journalled and supported within the coarse grind plate **55** having a series of parallel longitudinally extending feed apertures **57.** These apertures range in dimension from one-half to three-eighths inches for providing a coarse grind of the materials which may be food or meat products.

A series of peripheral and radial slots **59** are located within the perimeter of grinder plate **55** and are adapted to receive a series of inwardly extending bosses **61** at the outer threaded end of body **41,** over which is positioned the retainer nut **63** to hold said grinder plate in position.

A grinder knife **53** having a series of sharp blades has a square aperture which is received over the square portion **51** of journal **47** and is adapted for cooperative cutting rotation with respect to the inner surface of plate **55.**

The drive shaft **65** for said worm is aligned therewithin gear box **13** and has a splined portion **67** over which is slidably positioned clutch **69** reciprocal longitudinally of said spline by an exterior control handle **70** mounted upon the column **19.**

Said gear box includes boss **71** and a cooperating boss **73** in the cover, bushing **75** in boss **71,** and roller bearing **77** providing a support and journal for shaft **65,** said roller bearing taking up end thrust.

The outer end of shaft **65** is square at **81** and projects snugly within a corresponding aperture in bushing **83** affixed within the inner end of screw **45** in registry with the adjusting screw **85** for taking up any slack or wear on the plate **55** or grinder knives **53.**

The internal surface of said body has a spiral form **87** which is highly polished. Said body at its inner end has a mounting flange **89** which is positioned over a centering ring **91** projecting from said gear box.

A pair of fasteners are employed on opposite sides of the mounting flange for registry with said gear box and column for removably securing said upper grinder head thereto.

LOWER GRINDER HEAD

The lower grinder head **93** is of the same construction as the upper grinder head, and includes an elongated cylindrical stainless steel body **95** having an internal polished spiral groove **97.** The inner end of said body includes a mounting flange **99** which registers over a corresponding centering ring **101** upon the outer surface of tank **21.** Oppositely arranged lateral bosses **103** are slotted, one upwardly, one downwardly, and are adapted to be positioned over the corresponding fasteners **113** projecting from said tank, and secured thereto in the same manner as the body **41** of the upper

grinder head is secured to the gear box and easily removable therefrom, including nuts **105.**

The elongated stainless steel feed worm **112** is positioned within channel **33** and projects through the bore of body **95** and at its outer end mounts the journal **47** of the same construction as that shown in connection with the upper grinder head.

Mounted upon said journal and secured thereto is a similar rotatable grinder knife **53** whose blades register with the inner face of grinder plate **107** having a series of parallel apertures **57** therethrough of a smaller size. These range one-eighth to three-sixteenths inches for the final grind of the food product mix such as meat. A corresponding nut **63** maintains the assembly of plate **107** with respect to body **95,** in the same manner as shown in connection with the upper grinder head including the corresponding radial slots **59** in plate **107** and corresponding inwardly extending bosses **61** at the outer end of the body.

In delivering ground meat through channel **31** and through the body **95** of the fine grinder head **93,** and through grinder plate **107,** there are considerable outward forces applied to the grinder head.

To sustain these forces, there are provided upon opposite sides of channel **33** a pair of tie rods **113** whose outer ends project through the flange **99** of the lower grinder head and are affixed thereto by the same fasteners **105,** FIG. **1.** The inner ends of tie rods **113** project into the column **19** and are affixed thereto as by similar fasteners **115.**

INNER PADDLE ASSEMBLY

The power driven shaft **117** projects from said gear box and has a square end portion **119** adapted to supportably receive and drivingly engage one end support **121** of the inner paddle assembly **123,** there being a suitable paddle securing nut **125** engagable over the outer end of said shaft.

In alignment with drive shaft **117** and spaced longitudinally thereof is a corresponding coaxial idle shaft **127** which is journalled through a two part sleeve **129** mounted in the tank side wall with a suitable bearing **75** interposed, and whose inner end projects inwardly of the tank wall.

The sleeve assembly includes a fastening nut **131** which engages said sleeve and tank and a corresponding suitable plastic seal **132** made of Parathane or other plastic material for registry with idle shaft **127.**

The inner end of said shaft is square as at **133** and is adapted to drivingly engage the other end support **121** of the inner paddle assembly and is secured thereon by a corresponding blind nut **125.**

An apertured thrust bearing **135** on the end of shaft **117** is adapted to receive a corresponding coaxial stud shaft **137** anchored to the gear box cover at **139** to take up end thrust of shaft **117** providing for longitudinal adjustment thereof as desired.

In order to disassemble the inner paddle assembly, the nuts **125** are removed and the idler shaft **127** projected outwardly as shown in dotted lines to permit disengagement of the end supports **121** from shafts **117** and **127.**

OUTER PADDLE ASSEMBLY

The outer paddle assembly **151** is driven by the elongated drive sleeve **141** mounted over drive shaft **117,** the latter being journalled within gear box boss **143** with a suitable bushing **75** interposed.

Said sleeve projects through the wall of the tank through a two piece support sleeve, seal and nut assembly **145** with its splined end portion **147** projected through one of the end supports **149** of the outer paddle assembly and is secured thereto by the nut **153** with a suitable seal interposed. The corresponding oppositely arranged outer paddles are of general spiral shape and are connected to the respective end supports **149.** The outer end support has a central boss **155** with threaded portions at its opposite ends and is rotatably journalled over the idle shaft **127** with a suitable bushing **75** interposed.

Suitable nuts and seal asssmbiles **157** are mounted around the idler shaft and threadedly engage the corresponding ends of boss **155** completing the mounting of the outer paddle assembly within said tank.

POWER TRANSMISSION

Referring to FIGS. **2** and **4,** the present power transmission includes a suitable electric motor M, which is supported within and upon the base **17** and has an output shaft **200** which is drivingly connected to the shaft **159** by a suitable timing belt **202** and pulleys **204** and **206** for rotating the associated helical gear **161.** Shaft **159** is journalled in the gear box and cover **13–15** by roller bearings **208.**

Gear **161** is in mesh with helical gear **163** made of ductile iron and journalled and retained upon shaft **164** supported and journalled within the gear box and cover, FIG. **1,** with a suitable bushing **75** interposed between gear **163** and said shaft, and employing roller bearings **208.**

Helical gear **167** is journalled upon shaft **164** and is secured to gear **163** by fastener **165** for rotation therewith with bushing **75** interposed between gear **167** and said shaft.

Gear **167** is in mesh with helical gear **175** which is journalled upon shaft **109** with a suitable bushing **75** interposed. Said shaft is journalled within the gear box boss **111** and a corresponding boss **112** on the gear box cover with bushing **75** interposed and with corresponding roller end thrust bearing **79.**

The outer end of shaft **109** corresponding to the shaft **65** is similarly square at **81** and projects within a square opening in bushing **83** secured within the inner end of feed screw **112.** A suitable adjusting screw **85** is positioned within the said inner end of said screw for registry with shaft **109.**

Longitudinally reciprocal clutch **171** slidably positioned upon the spline **173** of shaft **164** is adapted for interlocking registry with the clutch element **169** upon gear **167** so that when said clutch is engaged by movement of handle **210** upon the exterior of the gear housing, shaft **164** will rotate effecting rotation of its corresponding pinion **174,** FIG. **1.**

Helical gear **175** journalled upon shaft **109,** also has a clutch element **177** adapted for cooperative registry selectively with the longitudinally reciprocal clutch **179** slidably positioned upon the splined portion **181** of shaft **109** for driving the same. This is under the selec-

tive control of a lever 212 on the outside of said gear box and connected to clutch 179.

The power rotated gear 175 mounts axially thereon sprocket gear 183 which through a suitable sprocket chain 185, is in driving engagement with the sprocket gear 187 on sprocket support 184 journalled upon shaft 65 with a suitable bushing 75 interposed.

The sprocket gear 187 has a clutch element 191 adapted for selective registry upon longitudinal adjustment of the clutch 69 with respect to the spline 67 of shaft 65 under the manual control of a swing lever 70 upon the exterior of the gear housing, FIG. 2.

Pinion 174 is in mesh with spur gear 193 which is affixed to the inner paddle drive shaft 117 as at 135 for rotating the same.

Spur gear 195 is coaxially positioned with respect to shaft 117 and at 197 is secured to the drive sleeve 141 journalled on shaft 117 for effecting rotation of the outer paddle assembly 151. An intermediate idler gear, not shown, is interposed between pinion 174 and gear 195 for driving the same in a direction opposite from the direction of rotation of gear 193.

By this construction, the outer paddle assembly 151 is adapted to rotate clockwise, whereas, the inner paddle assembly is adapted to rotate counterclockwise and simultaneously for the material mixing operation within tank 21.

OPERATION

In normal operation the motor M when energized effects rotation of the driven shaft 159 and its pinion 161, causing rotation of gear 163 journalled upon shaft 164. This causes rotation of gear 167 journalled upon shaft 164 and corresponding power rotation of gear 175 journalled upon worm drive shaft 109. There is simultaneous rotation of sprocket gear 183 as well as the corresponding upper sprocket gear 187 journalled upon worm drive shaft 65.

Thus, with the motor energized, the respective gears are rotating continuously; namely, pinion 161, FIG. 4, gear 163, gear 167, gear 175, sprocket 183, sprocket 187.

Sprocket 187 has a clutch element 191 adapted for selective registry with the longitudinally reciprocal clutch 69 on shaft 65.

Gear 167 has a clutch element 169 adapted for selective registry with the longitudinally reciprocal clutch 171 upon shaft 164 for effecting power rotation of shaft 164.

Similarly, gear 175 has a clutch element 177 adapted for cooperative registry with longitudinally reciprocal clutch 179 on shaft 109 for rotating the same.

Accordingly, there is provided upon the exterior of the gear box three vertically disposed clutch control handles 70, 210 and 212 for the corresponding top clutch 69 to control rotation of the worm drive shaft 65, the intermediate clutch 171 for effecting rotation of shaft 164 and its pinion 174 for effecting rotation in opposite directions of the paddle drive gears 193 and 195.

At the same time, the lower clutch 179 has a separate manual control for bringing it into drive engagement with the corresponding clutch element on gear 175 for rotation of screw drive shaft 109.

Thus, with the motor energized with the upper clutch conrol 70 moved to an "in" position, there will be a rotative drive of feed screw 45 in the upper grinder head so that meat or other materials introduced within the hopper 43 will be fed outwardly through the grinder plate 55 and down into tank 21.

With or without the feed screw 45 rotating, the mixing mechanism including inner and outer paddles for simultaneous rotation in opposite directions may be activated by manual control 210 of the middle clutch 171 to an energizing position causing powered rotation of shaft 164, its pinion 174 and the two gears 193 and 195.

Gear 193 rotates the inner paddle drive shaft 117 in one directin and the gear 195 through an intermediate gear effects rotation of the outer paddle drive sleeve 141 in the opposite direction.

Thus, continuous rotation of the inner and outer paddles for the mixing operation can continue under manual control during operation of the coarse grinder head or with the operation of the coarse grinder head interrupted.

The fine grind is accomplished in conjunction with the outward feed of the products mixed by activation of the lower clutch arm 212 for engaging the third clutch 179 to, thus, effect rotation of the feed screw 112 within the channel 31, said screw projecting into the lower fine grinder head 93.

Thus the fine grinder head 93 may operate alone or operate in conjunction with the continuous mixing of the inner and outer paddles and with or without continuous operation of the coarse grinder head 39.

Any one of these three may be operated alone or in conjunction with any other or any other two elements. Thus, the fine grinding and mixing can be accomplished and coarse grinding all at the same time in a continuous operation as desired.

In FIG. 2, the clutch control 210 is illustrated in detail and is the same for clutch controls 70 and 212. The control shaft 216 is rotatively anchored at 218 with respect to the column 19. Its inner end is biased into the gear box 13 at 220 and journalled at 222. The eccentric 224 on the inner end nests within a slotted portion of clutch 171. Thus, clockwise rotation of control 210 will effect movement of the clutch to the right to engage the clutch element 169 on gear 167 to cause rotation of shaft 164.

The motor M, FIG. 2, is anchored at 226 upon support plate 228 on one side pivotally mounted at 230 upon base 17. Its opposite side is adjustable at 232 for regulating the tension in timing belt 202.

Elongated rectangular loading tray 234 has a pair of lateral trunions 236 intermediate its ends which pivotally nest in and are removable from a pair of spaced brackets 238 on the column 19. The throated outlet 240 on the bottom of the tray at one end cooperatively nest down into the hopper 43.

Apertured safety guard plate 242 is spaced above outlet 240 by a pair of support posts 244. These have a shoulder 246 which rest upon the tray. Portions of the post extend through the tray bottom and include lateral locking notches 248. These are adapted to receive the ends of swing latches 250 pivotally mounted upon the under side of the tray at 252, FIG. 3.

Having described my invention, reference should now be had to the following claims.

I claim:

1. In a power operated meat grinder and mixer having a base with a column, a motor thereon with an output shaft, and a gear box;

a tank having a mixing chamber mounted on said column;

an upper coarse grinder head including an elongated body removably mounted on said gear box and including a hopper at one end, an outlet at its other end communicating with said tank, and a feed worm journalled in said body;

a drive shaft projecting into said tank for rotation in one direction;

an inner mixing paddle mounted and journalled for rotation in said tank and secured to said drive shaft;

a drive sleeve extending into said gear box journalled on said drive shaft and projecting into said tank for rotation in the opposite direction;

an outer mixing paddle mounted and journalled for rotation in said tank and secured to said sleeve;

an upwardly opening feed channel at the lower end of and secured to said tank and communicating therewith and outletting through the tank side wall;

a lower fine grinder head including an elongated body removably mounted on the exterior of said tank and having a bore in axial registry with said channel, and an outlet;

a feed worm rotatably journalled through said channel and latter body;

a transmission in said gear box including a first splined shaft aligned with and secured to said upper grinder feed worm;

a second splined shaft parallel to and adapted for connection to said mixer shaft and sleeve;

and a third splined shaft aligned with and secured to the lower grinder feed worm;

independently operable clutches slidably keyed to said shafts respectively;

and a train of interconnected gears journalled on each of said shafts connected to said motor for simultaneous rotation; whereby on selective actuation of said clutches, the corresponding feed worms and mixer paddles are actuated for independent rotation and for operation in unison.

2. In the power grinder and mixer of claim **1**, the mounting of said upper grinder head including an annular flange at the inner end of its body, a mounting ring on said gear box receiving said flange, and fasteners removably securing said body flange to said gear box.

3. In the grinder and mixer of claim **1**, the mounting of said lower grinding head including an annular flange at the inner end of its body, a mounting ring on said tank exterior coaxial of said body, receiving said flange, and fasteners securing said flange to said tank.

4. In the grinder and mixer of claim **1**, a pair of spaced tie rods at their one ends secured to said lower grinder head with their outer ends secured to said base.

5. In the grinder and mixer of claim **1**, the mounting of said lower grinder head including an annular flange at the inner end of its body, a mounting ring on said tank exterior coaxial to said body, receiving said flange, fasteners securing said flange to said tank; and a pair of spaced tie rods at their one end secured to said lower grinder head with their other end secured to said base.

6. In the grinder and mixer of claim **1**, a grinder plate having a series of bores therethrough mounted and secured upon the outlet end of each grinder head body; an interchangeable journal stud axially secured upon the outer end of each worm and journalled through the corresponding grinder plate; and a grinder knife secured upon each journal stud for rotative cutting engagement relative to the corresponding grinder plate.

7. In the grinder and mixer of claim **1**, the mounting of said inner paddle including an idler shaft spaced from and aligned with said inner paddle drive shaft and journalled within an outer wall of said tank; and radial end supports on said inner paddle affixed to said idler shaft.

8. In the power operated grinder and mixer of claim **1**, the mounting of said inner paddle including an idler shaft spaced from and aligned with said inner paddle drive shaft and journalled within an outer wall of said tank; radial end supports on said inner paddle affixed to said idler shaft; the mounting of said outer paddle including radial end supports on said outer paddle journalled upon said idler shaft.

9. In the grinder and mixer of claim **1**, a removable cover overlying said tank and enclosing said upper grinder head; a normally open safety switch on said gear box having a swing arm and connected to said motor; said cover on assembly to said tank including a projection engaging said swing arm closing said switch.

10. In the grinder and mixer of claim **1**, there being a continuous polished spiral groove along the interior of the bodies of said upper and lower grinder heads facilitating passage of ground material therethrough.

11. In the grinder and mixer of claim **1**, said gear train including a first gear journalled upon said second splined shaft and connected to said motor output shaft; a second gear coaxially secured to said first gear and journalled on said second splined shaft and having a clutch element; a third gear journalled on said third splined shaft in mesh with said second gear and having a clutch element; a first sprocket gear secured to said third gear; a second sprocket gear journalled on said first splined shaft and connected to said first sprocket gear and having a clutch element; said first, second and third gears and said sprocket gears being rotatable in unison with said motor output shaft; the respective clutches being manually adjustable between "in" and "out" positions for selective interlock with the corresponding clutch elements for operating said grinders and mixer independently, in pairs and jointly.

12. In the grinder of claim **11**, coaxial independent first and second gears secured to said mixer drive shaft and drive sleeve respectively; a pinion on and rotatable with said second splined shaft in mesh with said first gear; and indirectly connected to said mixer second gear whereby said inner and outer mixing paddles rotate in unison and in opposite directions.

13. In the grinder of claim **1**, a pair of laterally spaced slotted brackets secured to and projecting above said column; an elongated loading tray overlying said column; a pair of laterally directed trunions on the tray intermediate its ends pivotally and removably nested within said brackets and supported thereon; and a throated outlet at one end of the tray depending therefrom and cooperatively nested within the hopper of the upper grinder head.

14. In the grinder of claim **13**, an apertured safety guard plate mounted on said loading tray overlying its outlet; a pair of support posts depending from said plate resting upon the tray and projecting through its bottom walls; lower portions of said posts being laterally slotted; and quick release swing latches pivoted upon the bottom of the tray with their ends respectively nested in said post slots.

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