April 17, 1934. G. W. DELL 1,955,413

MIXING MACHINE

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Fig. 1

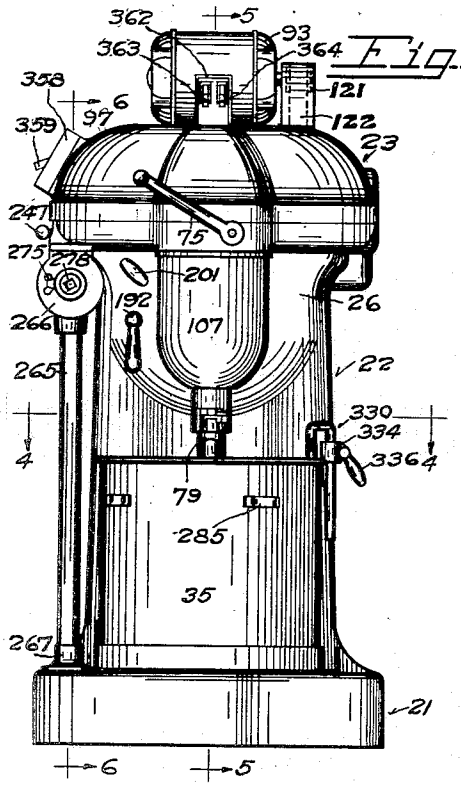


Fig. 2

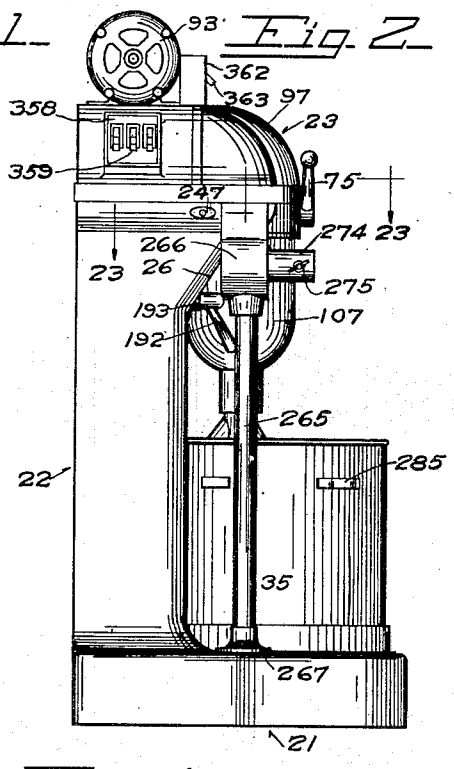


Fig. 3

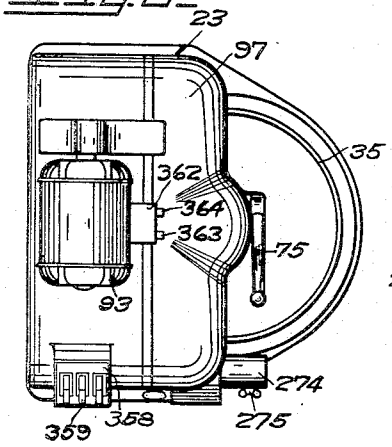
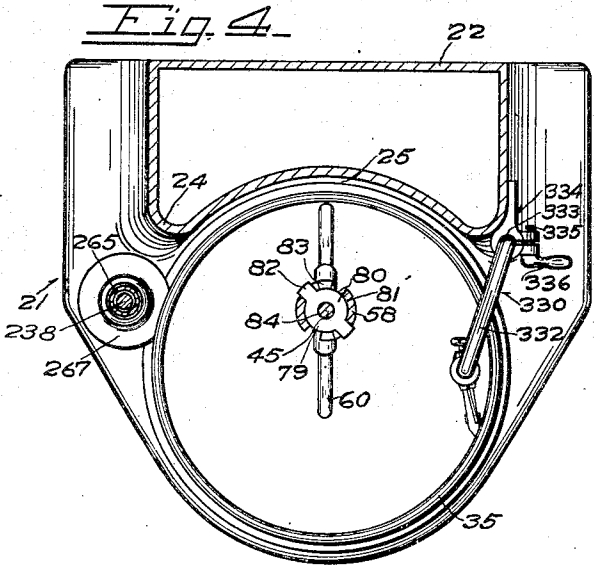


Fig. 4



INVENTOR:

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April 17, 1934. G. W. DELL 1,955,413

MIXING MACHINE

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Fig. 5

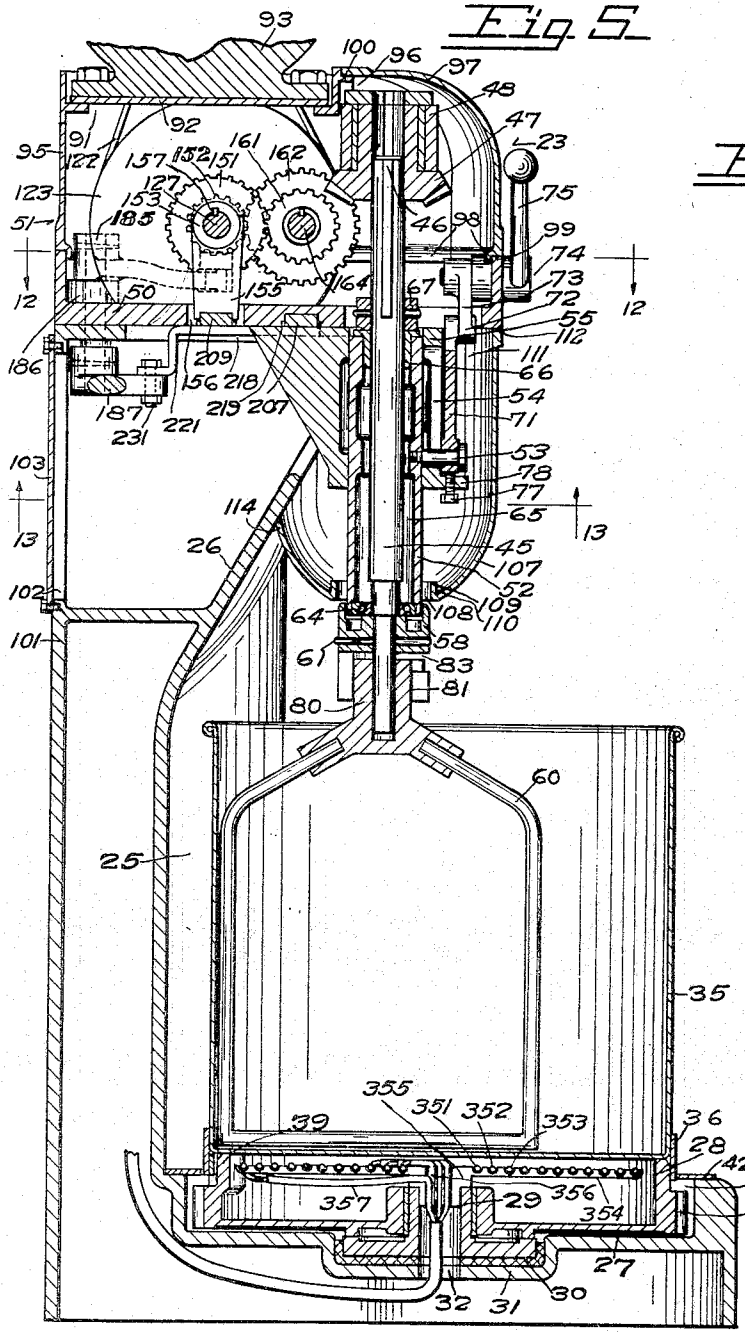
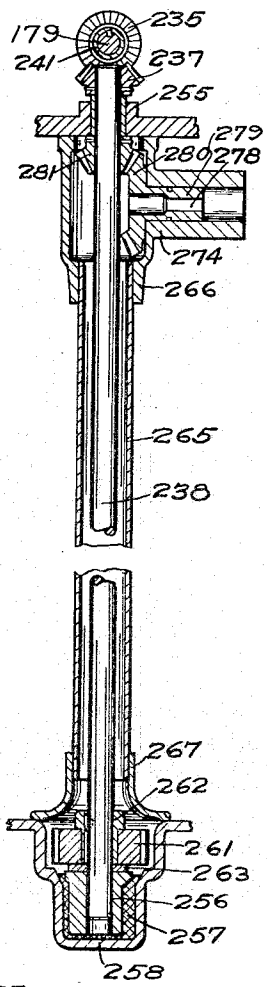


Fig. 6



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April 17, 1934. G. W. DELL 1,955,413

MIXING MACHINE

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Fig. 7.

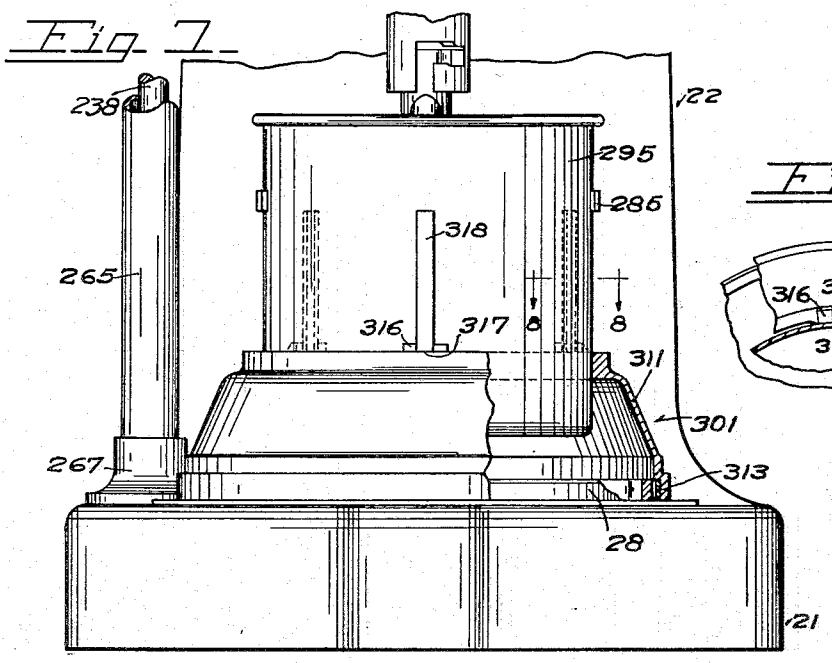


Fig. 8.

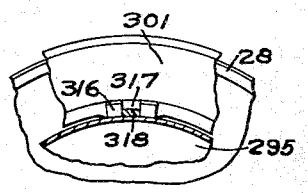


Fig. 9.

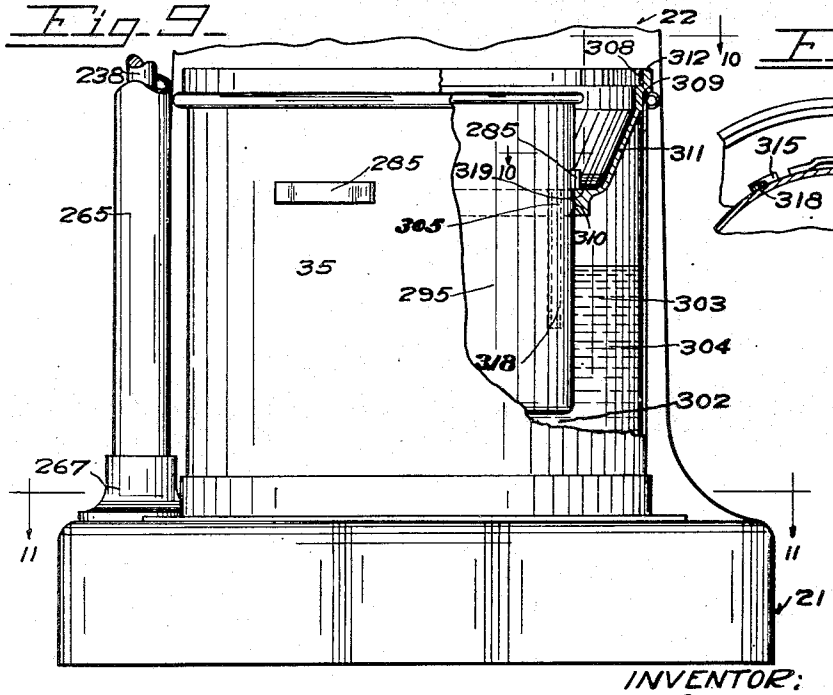


Fig. 10.

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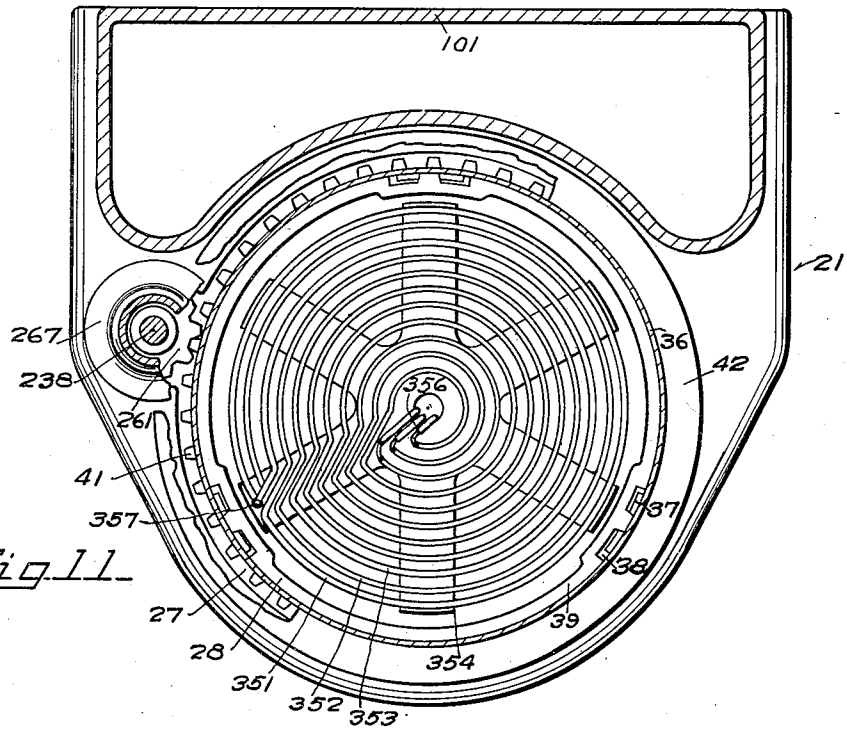


Fig. 11.

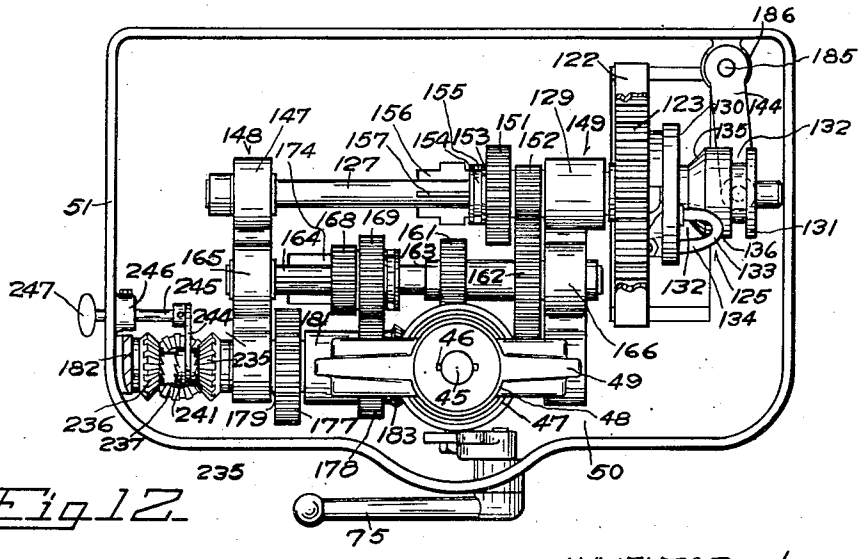


Fig. 12.

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Fig. 13

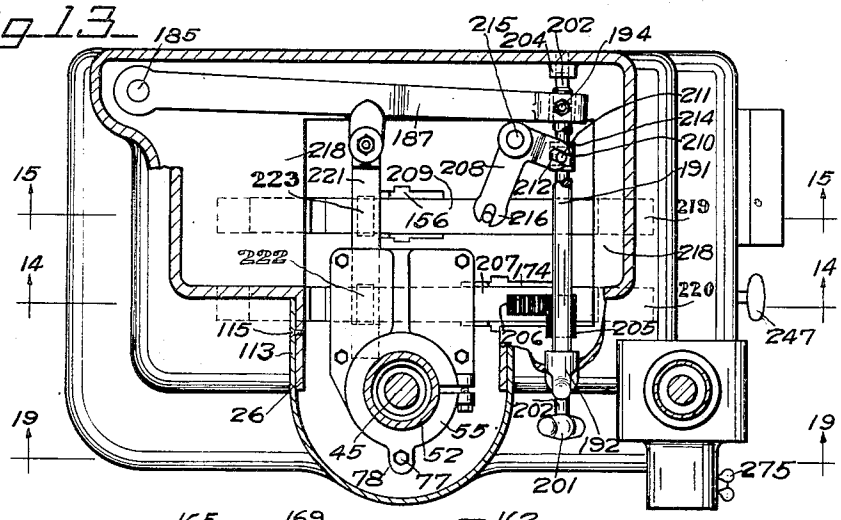


Fig. 14

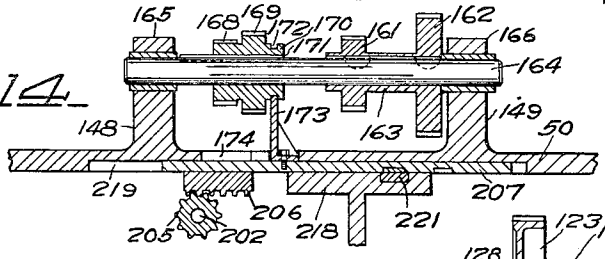


Fig. 15

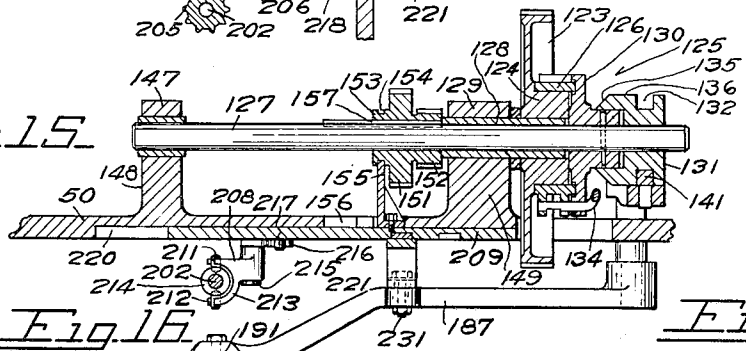


Fig. 16

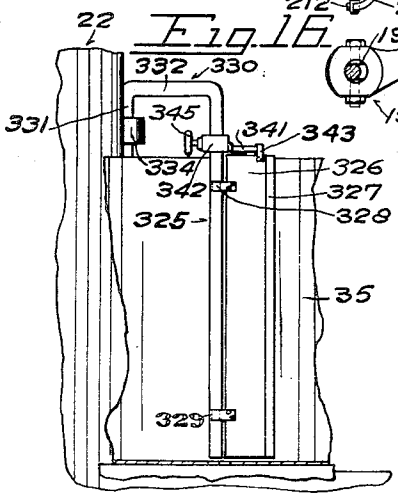


Fig. 17

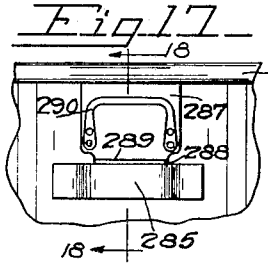
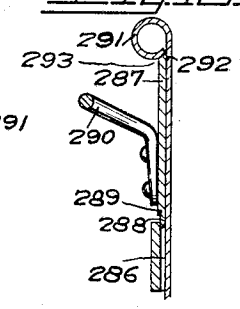


Fig. 18



INVENTOR:
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MIXING MACHINE

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Fig. 19

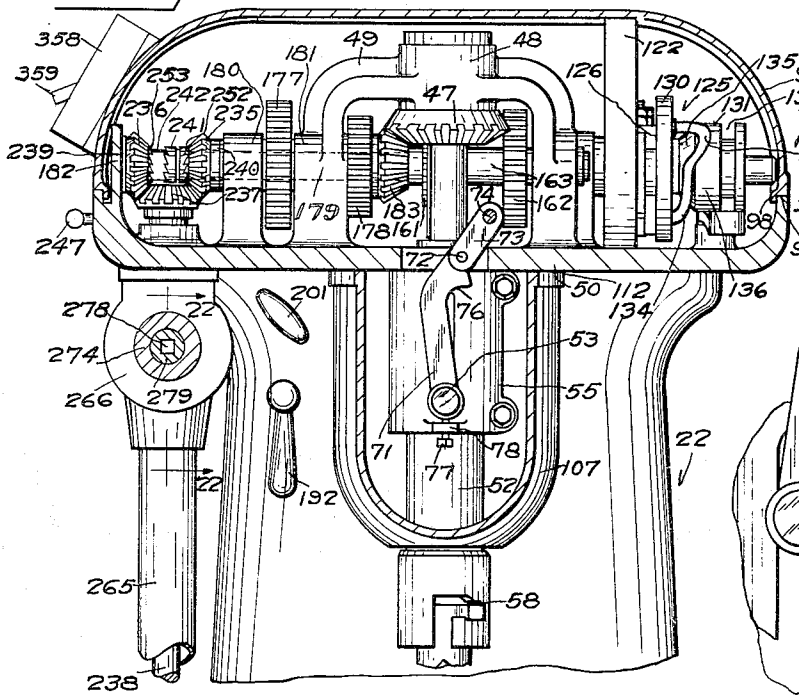


Fig. 20

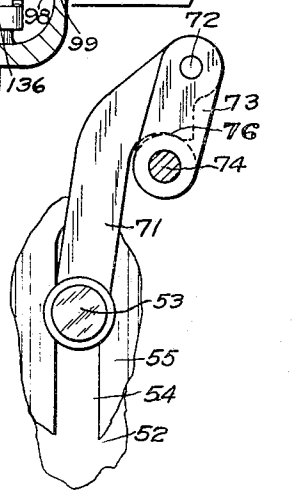


Fig. 21

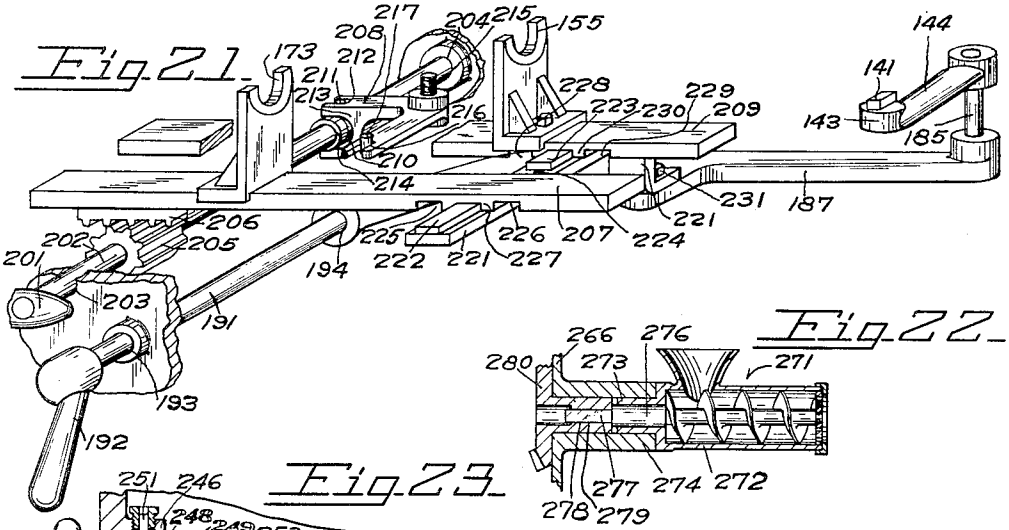
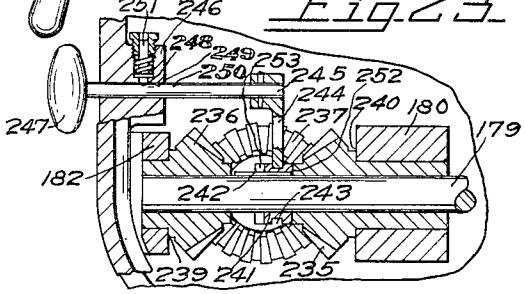


Fig. 22

Fig. 23



INVENTOR:
George W. Dell
by Geo. P. Webster,
His Attorney.

Patented Apr. 17, 1934 1,955,413

UNITED STATES PATENT OFFICE

1,955,413

MIXING MACHINE

George W. Dell, Cheviot, Ohio, assignor to The Triumph Manufacturing Company, Cincinnati, Ohio, a corporation of Ohio

Application December 15, 1930, Serial No. 502,496

10 Claims. (Cl. 259—85)

My invention is primarily intended for preparing mixes in the baking industry, and is also applicable for other purposes.

Mixing machines in the baking industry usually comprise so-called dough mixing machines and so-called cake mixing machines.

Dough mixing machines in general use comprise a horizontally disposed stationary trough in which mixing arms rotate on a horizontal axis for mixing the ingredients of the dough and conditioning the dough. Such machines are usually employed where it is desired to mix large batches of dough for bread. They are expensive machines out of the financial reach of small bakeries.

So-called cake mixing machines usually comprise a stationary bowl on a vertical axis and a whip or beater which rotates on a vertical axis and at the same time travels planetwise about the axis of the bowl. Such machines are usually employed in mixing batters for cakes, in beating eggs, making icings, and the like, and is essentially a small batch machine.

It is the object of my invention to provide a mixing machine capable of performing the duties of a so-called cake mixer or small batch machine and is also capable of performing the duties of a so-called dough mixer or large batch machine; and, further, to provide a machine within the financial reach of small bakeries and capable of mixing cake batters and bread dough mixes of substantial sizes.

So-called cake mixers are subjected to great strains, due to the combined rotary movements and planetary movements imparted to the rotating whips or beaters, and to the overhanging relations of the means for imparting such rotary and planetary movements.

In my improved device I have provided means whereby rotary movements only are imparted to the mixing tools and whereby such mixing tools are eccentrically located and stationarily positioned with relation to the position of the bowl, during the mixing operation. I have further provided means for rotating the bowl with relation to the mixing tools, for bringing the contents of the bowl into coaction with the stationarily positioned mixing tool, whereby the racking and torsional strains due to planetary movements of whips or beaters are dispensed with.

It is the object of my invention to provide novel means for rotating the mixing bowl and rotating the mixing tool in a mixing machine; further, to provide novel means for supporting the mixing bowl; further, to provide novel means for supporting a depending spindle for the mixing tool; further, to provide novel means for relatively supporting and relating the rotatable mixing bowl and the rotatable mixing tool; further, to provide a novel frame structure for supporting and relating the mixing bowl and the mixing tool; further, to provide novel means for driving the mixing bowl and the mixing tool; further, to provide novel means in a machine of this type for supporting bowls of different sizes relatively to the axis of rotation of the mixing tool; further, to provide novel tempering means for the bowl; further, to provide novel means for relating the bowl to the frame of the machine for obtaining compactness of structure and sturdy operation of the parts; and, further, to provide novel means to insure removal of the lifting means for the bowl so as to provide close approach of the bowl to the column of the machine.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Fig. 1 is a front elevation of my improved device.

Fig. 2 is a side elevation of the same.

Fig. 3 is a plan view of the same.

Fig. 4 is a horizontal section of the same, taken on the line 4—4 of Fig. 1.

Fig. 5 is a vertical axial section of my improved device, taken on the line 5—5 of Fig. 1, and partly broken away.

Fig. 6 is an axial section of the transmitting means for rotating the bowl-support, taken on the line 6—6 of Fig. 1, and partly broken away.

Fig. 7 is a front elevation of my improved device, partly broken away, illustrating an adapter ring for independently supporting a smaller bowl.

Fig. 8 is a cross-sectional detail view of the same, taken in the plane of the line 8—8 of Fig. 7.

Fig. 9 is a front elevation, partly broken away, illustrating an adapter ring supporting a smaller bowl within a larger bowl.

Fig. 10 is a cross-sectional detail view of the same, taken in the plane of the line 10—10 of Fig. 9.

Fig. 11 is a cross-section of my improved device, taken on the line 11—11 of Fig. 9, and partly broken away.

Fig. 12 is a plan view of my improved device, showing the canopy in horizontal section in the plane of the line 12—12 of Fig. 5, and partly broken away.

Fig. 13 is a bottom sectional view of my im-

proved device, taken in the plane of the line 13—13 of Fig. 5.

Fig. 14 is a vertical section of the exemplifying speed changing means, taken on the line 14—14 of Fig. 13, and partly broken away.

Fig. 15 is a vertical section of the same, taken in the plane of the line 15—15 of Fig. 13, and partly broken away.

Fig. 16 is a side elevational detail view of the scraper for the inside of the bowl, partly broken away.

Fig. 17 is a side elevation of the lifting means for the bowl, partly broken away.

Fig. 18 is a cross-section of the same, taken on the line 18—18 of Fig. 17.

Fig. 19 is a cross-section of my improved device, taken in the plane of the line 19—19 of Fig. 13, and partly broken away.

Fig. 20 is a perspective view of the exemplified driving means of my improved device, partly broken away.

Fig. 21 is a front elevational detail view of the means for raising and lowering the spindle for the mixing tool, shown in raised position.

Fig. 22 is an axial section of a detail taken in the plane of the line 22—22 of Fig. 19; and,

Fig. 23 is a detail view of the bowl reversing means, taken in section on the irregular line 23—23 of Fig. 2.

A base 21 is at the lower end of a column 22 which has a canopy 23 at its upper end. The column is formed with forwardly extending upright bulges 24 at its sides. (Figs. 2, 4 and 5). An upright recess 25 is formed at the front of the column between said forwardly extending upright walls or bulges, said base and said canopy. The upper portion of the front wall of the column extends forwardly and upwardly as shown at 26 for aiding in strengthening the frame and resisting strains by the working parts.

The base is provided with an upwardly extending recess 27 in which there is a rotatable bowl-support 28. (Figs. 5 and 11). An upright journal stud 29 extends upwardly into said recess from the bottom of the recess and is fixed to the base, as in a solidified bath 30 of babbitt metal in a cup 31 formed in said base. (Fig. 5). The stud and the parts of the base in axial line therewith are provided with a bore 32.

A bowl 35 is mounted on the bowl-support and is arranged to rotate therewith. (Figs. 5 and 11). It has an annular depending flange 36 provided with inner lugs 37 received in slots 38 in the outer face of the annular supporting flange 39 of the bowl-support, for forming driving connection with the latter.

The bowl-support is provided with teeth 41 forming a gear. (Figs. 5 and 11). An annular protecting plate 42 on the upper edge of the peripheral wall of the recess 27 forms an overhanging flange for said wall to substantially close the space above said teeth and outside the depending annular flange 36 of said bowl.

A depending spindle 45 has spline key and groove connection 46 with a bevel gear 47, the hub of which is journaled in a bearing 48 of a yoke 49 extending upwardly from the bottom plate 50 of a gear-box 51 at the top of the column. (Figs. 5, 12, 13 and 19). The spindle 45 extends downwardly and is carried in a spindle-sleeve 52 in which it is rotatable. The spindle-sleeve is prevented from rotation by a stud 53 fixed thereto, which rides in a slot 54 in the main spindle bearing 55, fixed to the bottom of the gear-box and depending from the gear-box. The bearing 55 is shown as a clamp-bearing. (Fig. 13).

One member 58 of releasable connecting means between the lower end of the spindle and a rotatable mixing tool 60 is fixed to the lower end of the spindle by a pin 61. (Fig. 5). There is a ball bearing 64 between the lower end of the spindle above this member or whip-socket 58, and the lower end of the sleeve 52. A space 65 is shown between this sleeve and the spindle, the sleeve being centered and clamped in the bearing 55 and the lower end of the spindle being centered by the ball-bearing 64. The middle portion of the spindle is centered in a bushing 66 pressed into the upper end of the sleeve 52, and its upper end is centered in the bevel-gear 47.

On the upper portion of the spindle-sleeve 52 there is an end-thrust collar 67 fixed to the spindle by a suitable pin or screw. The spindle 45 rotates with the gear 47 and in the sleeve 52, and is moved up and down by said sleeve. The spindle is held endwise between the collar 67 and the ball bearing 64.

The stud 53 is articulated with a link 71, which is in turn articulated at 72 with an arm 73 fixed to a rock-shaft 74, to which a handle-arm 75 is also fixed for forming a lever. (Figs. 1, 5, 19 and 20). The link 71 is provided with a seat 76 which in the up-position of the lever is received about the hub of the arm 73.

When in such up-position the weight of the spindle and attendant parts is supported by the seat 76 about the hub of the arm 73, for locking the spindle in up-position.

An adjusting bolt 77 is adjustable in a threaded bearing in a lug 78 on the bearing 55. (Figs. 5, 13 and 19). This adjusting bolt is arranged to be engaged by the lower end of the link 71 for adjustably limiting the downward movement of the spindle, for locating the correct relation between the bottom of the mixing tool and the bottom of the bowl. This adjustment is primarily intended as an initial adjustment, the rotatable tools being in practice made of the desired lengths so that their bottoms operate in proper proximity to the bottoms of the bowls for making the mixes for which they are intended.

The rotatable mixing tool is provided with a releasable connecting member 79 arranged to be releasably connected with the connecting member or whip socket 58, as by being provided with a stud 80 received in the socket 81 and having bayonet pins 82 received in bayonet slots 83 of the member 58 for properly supporting the rotatable mixing tool and releasably fixing it in axial alignment with the spindle. (Figs. 4 and 5). The member 79 has a socket 84 in which the lower reduced end of the spindle 45 is received for aiding in proper alignment of the spindle and mixing tool.

The spindle is raised into up-position by means of the handle 75 so that the rotatable mixing tool may be readily secured to or removed from the spindle. The spindle is locked into such up-position so as to prevent accidental dropping of the spindle during such manipulation of the mixing tool and while performing other operations in or about the machine with the spindle in up-position.

After the mixing tool is positioned on the spindle, the spindle is lowered by manipulation of the handle 75, thereby positioning the lower end of the mixing tool in proper relation with the bottom of the bowl.

The spindle has an upright axis of rotation

which is eccentric to the upright axis of rotation of the bowl. (Figs. 4 and 5). The direction of rotation of the bowl is preferably opposite to the direction of rotation of the spindle, so that the lateral wall of the bowl moves opposite to the proximate side of the mixing tool, and said last-named side of the mixing tool moves toward the on-coming peripheral part of the mix in the bowl. Means are provided, however, for rotating the bowl in the opposite direction, whereby the relative speed of movement between the wall of the bowl and the mix therein and the proximate portion of the periphery of the mixing tool is reduced.

The diameter of the mixing tool is preferably at least as great as the radius of the mixing bowl and is instanced as somewhat greater than such radius, so as to insure that all portions of the mix in the mixing bowl shall be presented to the action of the mixing tool.

The peripheral speed of rotation of the mixing tool is also preferably greater than the peripheral speed of rotation of the mixing bowl.

Means are also provided for applying various speeds of rotation to the spindle and to the mixing bowl, the speeds of rotation of the spindle and of the mixing bowl being preferably related. Thus it may be stated as an example, but not as a limitation, that four speeds may be imparted to the spindle and to the mixing bowl in a ratio of approximately slightly more than three to one. The speeds of the spindle may be instanced as 54, 88, 150 and 247 revolutions per minute, and the speeds of the bowl may be instanced as 17, 26, 46 and 73 revolutions per minute. Further, the direction of rotation of the mixing bowl may be reversed for again qualifying this relation of speeds. This also imparts a somewhat different mixing action upon the contents of the bowl.

In the present exemplification the driving mechanism of the machine is at the upper portion thereof. The upper portion of the machine is shown formed as the gear-box 51 having the bottom plate 50 and provided with an opening 91 in its top, (Fig. 5), arranged to be closed by a cover 92 which forms the supporting plate for an electric motor 93 suitably fixed to said plate.

The upper rear part of the gear-box is formed by a removable frame-part 95 suitably held in place.

The front of the gear box is provided with an opening 96 arranged to be closed by a front cover 97, shown formed as a closing hood. The lower margin of the cover 97 has a flange 98 and rests upon a shoulder 99 of the canopy, and the rear margin of the cover rests on a flange 100 on the frame of the gear casing. (Figs. 5 and 19).

The column of the machine is provided with a rear wall 101 having an opening 102 arranged to be normally closed by a closing plate 103, suitably held in place. (Fig. 5).

A shield 107 of inverted bell form is received about the spindle 45 and its attendant parts, and has an opening 108 in its lower end in which the lower end of the spindle sleeve and spindle and their attached parts have limited axial movement for raising and lowering the mixing tool. (Figs. 5 and 19). The margin of this opening is provided with an annular flange 109 forming a protecting pocket 110 of said opening for retaining oil or grease which may drop from the operating parts in or above said shield.

The upper end of the shield is provided with an opening 111, the margins of which have connections with the column and the canopy for closing said opening. The forward portion of the upper margin of the shield is received against the bottom of the canopy as shown at 112 (Figs. 5, 13 and 19), and the side margins 113 are arranged to telescope the sides of the forward bulge 26 of the column, while the rear upper edge 114 of the margin of said opening is received against the bottom of said bulge. Screws 115 received through holes in the margins 113 and threaded into the side walls of the bulge 26 fix the shield in place.

It will thus be seen that by removal of the cover 97, the closing plate 103, and the shield 107, the operating parts of the spindle and the speed change mechanism therefor, and the control parts of the latter, are exposed to view and are accessible for attention.

The electric motor is provided with a suitable pulley 121 for driving a silent chain or belt 122 received thereabout and about a pulley 123 of the driving mechanism. (Figs. 1, 5, 12 and 15). The pulley 123 has one clutch element 124 of a clutch 125 thereon. The other clutch element 126 is drivingly connected with a drive shaft 127 of the speed change gearing so that release of the clutch leaves all of the driving mechanism neutral. The hub of the drive pulley 123 is mounted on a stationary bushing 128 extending from the bearing 129 of the drive shaft. The clutch element 126 is a split ring and rotates with a driving flange 130 fixed to the drive shaft.

A spool 131 is slidable on the drive shaft. The spool is provided with a groove 132 in which the shoe 141 pivoted to an operating arm 144 is received, for moving the spool endwise and clutching or releasing the clutch. The spool is provided with a frusto-conical face 135 and an annular resting face 136 arranged to engage the contact end 133 of a lever 134 when the spool is moved endwise for contracting the split ring 126 for engaging the clutch. When the spool is moved in the opposite direction the split ring releases its clamping engagement on the clutch element 124.

The shoe 141 has pivot connection with a bearing 143 of the operated arm 144, the shoe being received in an annular groove 132 in said spool. (Figs. 12, 15, 19 and 21).

The drive shaft 127 is journaled in the bushing 128 and in a bearing 147. The bearings 147 and 129 are respectively on ridges 148, 149, extending upwardly from the bottom of the gear-box.

The drive shaft 127 has a nest of gears 151, 152, thereon which move together, being part of or fixed to a sleeve 153 which is provided with an annular groove 154. (Figs. 5, 12 and 15). A fork 155 extends upwardly through a slot 156 in the bottom of the gear-box for moving the nest of gears endwise. The sleeve 153 has spline key and groove connection 157 with the drive shaft 127.

The gears 151, 152, are arranged to be placed in mesh respectively with gears 161, 162, which form part of or are mounted on a sleeve 163, which has fixed connection with a second shaft 164, which is journaled in bearings 165, 166, on said ridges. (Figs. 5, 12 and 14).

The shaft 164 has a shiftable nest of gears 168, 169, mounted thereon. (Figs. 12 and 14). The sleeve 170 of this nest of gears has spline key and groove connection 171 with the shaft 164. This sleeve is provided with an annular slot 172 into which a fork 173 reaches through a slot 174 in the bottom of the gear-box for moving the last-named nest of gears endwise.

The gears 168, 169, are selectively engaged

with gears 177, 178, fixed to a shaft 179 and journaled in bearings 180, 181, respectively on the ridge 148 and at the base of the yoke 49, and in a bearing 182 on the gear-box. (Figs. 12 and 19). The shaft 179 has a bevel pinion 183 fixed thereto. The bevel pinion 183 in turn meshes with the bevel gear 47 at the upper end of the spindle 45.

By this arrangement four speeds may be imparted to the spindle 45 through the medium of two speeds by selectively meshing the gears 151, 152, with the gears 161, 162, multiplied by two by selective meshing of the gears 168, 169, with the gears 177, 178.

Means are provided for selectively meshing the gears, means are provided for selectively clutching and declutching the clutch, and means are also provided for selectively interlocking said last two means so as to compel declutching of the clutch before changing speed relation in the gears, and to prevent change in speed relation of the gears during clutched relation of the clutch, in order to prevent detrimental action of the mixing tool upon the mix. The resistance to rotation of the mixing tool caused by contact of the mix therewith causes quick cessation of rotation of the mixing tool upon declutching of the clutch and permits ready shifting of the gears for changing speed and minimizes clashing between the teeth during such speed change.

Upon declutching of the clutch full driving connection between the drive-shaft and the mixing tool is in effect so that the resistance to rotation of the mixing tool in the material, which acts as a brake, is communicated to all of the operating parts for instantly causing cessation of rotation of the same and permitting speedy and noiseless speed change in the speed changing mechanism.

The arm 144 for operating the clutch forms part of a bell-crank lever which comprises said arm, an upright rocker rod 185 journaled in a bearing 186 in the bottom of the gear-box, and an operating arm 187 fixed to said rocker rod. (Figs. 2, 5, 13, 15, 19 and 21). An axially movable rod 191 is provided with a handle 192 and is slidable in a bearing 193 in the column. The inner end of the rod 191 has a loose articulation 194 with the movable end of the operating arm 187. The connections in this articulation are sufficiently loose to permit arcuate movements of the movable end of the arm 187 upon linear movement of the rod 191.

An operating handle 201 is arranged to move in and out and to rotate for correspondingly operating the shaft 202 to which it is secured. (Figs. 1, 13, 14, 15, 19 and 21). The shaft 202 is slidable and journaled in bearings 203, 204. It has an elongated pinion 205 fixed thereon which meshes with a rack 206 on a slide 207 for moving said slide lengthwise upon rotation of the handle 201 in either direction.

The shaft 202 also has operative connection with a bell crank lever 208 which in turn has operative connection with a slide 209 for moving said slide endwise in either direction upon endwise movement of the shaft 202 by in and out movement of the handle 201. (Figs. 13, 15 and 21). Thus the shaft 202 has a sleeve 210 thereabout from which pins 211 project into slots 212 of a double fork 213 which is part of said bell crank lever. Endwise movement of the sleeve 210 on the shaft is prevented by collars 214 fixed to said shaft. (Figs. 13, 15 and 21). Rotation of the shaft in the sleeve 210 is, however, permitted.

The bell crank lever 208 is pivoted on a stud 215 which is screwed to the under face of the gear-box. It has a fork 216 received about a pin 217 fixed in the slide 209 for moving said slide endwise. (Figs. 15 and 21).

The slides 207, 209, slide upon the upper face of the upper walls 218 of the column and are respectively guided in grooves 219, 220, in the bottom face of the bottom wall of the gear-box. (Figs. 5, 13, 14 and 15).

The slide 207 has the fork 173 fixed thereto and the slide 209 has the fork 155 fixed thereto.

For interlocking the operating means for the speed change gearing and the main clutch a slide 221 is provided which has interfering ridges 222, 223, thereon having a space 224 therebetween in which the slide 207 is located. (Fig. 21). The interfering ridge 222 is arranged to be received in slots 225, 226, in the slide 207 or to be interfered with by the face 227 of said slide. The interfering ridge 223 is arranged to be received in slots 228, 229, in the slide 209 or to be interfered with by the face 230 of said slide.

The slide 221 has articulating connection with the operating arm 187 by means of a pivot bolt 231. (Figs. 5, 15 and 21).

The parts are in such relation that when the movable gears of the speed change gearing will have been moved into any of their meshing relations for any of their speed relations by in and out or rotative movements of the handle 201, the interfering ridges 222, 223, will be in line respectively with one of the slots in the respective slides 207, 209, the clutch being in unclutched relation. Movement of the arm 187 by inward movement of the handle 192 engages the clutch and also moves the interfering ridges 222, 223, into one of the interlocking slots in the respective slides 207, 209. This locks the slides 207, 209, and locks the movable gears of the speed change mechanism in adjusted relation. Change in such speed relation is prevented until the interfering ridges 222, 223, are again removed out of locking relation with the slides 207, 209.

These interfering ridges are under control of the clutch operating arm 187 by being mounted on the slide 221 articulated at 231 with said arm. This arm must therefore first be moved by outward movement of the handle 192 in order to release the clutch, fully releasing the clutch, in order to release the locked relation of the slides 207, 209. Any movement of either the slides places the interfering locking faces 227, 230, thereon into line with interfering ridges 222, 223, for locking the operating arm 187 to prevent clutch engagement until speed changing movements of the slides have been completed for fully engaging the speed changing parts in their new speed changing relations.

No speed change can therefore be made during clutched relation of the clutch; nor can the clutch be placed in clutch relation until the movements of the parts for speed change shall have been completed; and there is no necessity for providing a common neutral position for any of the parts between changes in speed. This permits quiet and quick change to be made in the speed of rotation of the mixing tool and bowl, and permits the transition from one speed to another to take place without detrimental effect upon the dough or ingredients being mixed, and without interruption of aeration of the dough or chemical changes taking place in the ingredients.

The speed changing mechanism has operative connection with the spindle by means of the

bevel gears 183, 47, for rotating the rotatable tool. It also has operative connection with the bowl support for rotating the bowl.

Thus the shaft 179 has bevel pinions 235, 236, loosely rotatable thereon and held endwise on said shaft. (Figs. 6, 12 and 19). They mesh with a bevel gear 237 on an upright shaft 238. The bevel gear 236 has a hub journaled in the bearing 182 and the bevel gear 235 has a hub journaled in the bearing 180. These respective bevel gears are provided with annular shoulders 239, 240, coacting with said bearings for preventing separation between the same.

A clutch collar 241 has spline key and groove connection 242 with the shaft 179 and is provided with an annular groove 243 in which a fork 244 is received, the fork being fixed to a slidable rod 245 slidable in a bearing 246, and having an operating handle 247 thereon. (Figs. 19 and 23). The rod is provided with notches 248, 249, 250, in which a spring-pressed plunger pin 251 is selectively received for placing the clutch collar in neutral position or in endwise positions.

Clutches 252, 253, are located between the ends of the clutch collar and the bevel gears 235, 236, the clutches being shown as tooth clutches, the teeth thereof are on the respective ends of the clutch collar and the proximate ends of the bevel gears.

When the teeth of one of the clutches is engaged the shaft 238 rotates in one direction for rotating the bowl in one direction, and when the opposite clutch is engaged the shaft 238 rotates in the opposite direction for rotating the bowl in the opposite direction. When the clutch collar is in neutral position the bowl does not rotate.

The shaft 238 is journaled in a bearing 255 in the bottom wall of the gear-box and in a bearing 256 in the base of the machine. (Fig. 6). The bearing 256 is positioned in a solidified bath 257 in a socket 258 in the base. A pinion 261 is fixed to the shaft 238 as by being fixed to a bushing 262 keyed to said shaft. The bushing and pinion rotate on a thrust washer 263 positioned by the bearing 256.

The pinion 261 meshes with the gear 41 of the rotatable bowl support 28, (Figs. 6 and 11), for rotating the latter at various speeds determined by the arrangement of the speed change gearing in the gear-box. the rotations of the bowl support being selectively in either direction, determined by the position of the clutch collar 241 for engaging either of the clutches 252, 253.

There is a protecting tube 265 about the shaft 238. (Figs. 1, 2, 4, 6, 7, 9 and 11). The tube is received at its upper end in a housing 266, which forms an extension of the tube, and is secured to the bottom of the gear-box. The tube is at its lower end received in a spreading foot-piece 267 secured to the base of the machine.

The housing 266 forms a support for a kitchen attachment 271, (Figs. 6 and 22), which may be of any suitable character and be for instance a grinder of usual construction, the frame 272 of which has a stub 273 received in a bearing 274 of the housing and fixed in place by a clamp screw 275. (Figs. 2 and 3). The shaft 276 of the rotatable member of the kitchen attachment, for instance a chopper or grinder, has a squared end 277 received in a correspondingly formed socket 278 in the hub 279 of a bevel gear 280 journaled in the bearing 274. A bevel gear 281 is fixed to the upright shaft 238 and meshes with the bevel gear 280 for operating the kitchen attachment.

The bowl is mounted on the rotatable bowl support above the upright recess 27 in the base 21, the upper part of the machine forming a canopy over the bowl and having the upright spindle therein.

In order to provide compact arrangement of the parts the outer periphery of the bowl rotates in close proximity to the side and rear walls of the recess. Lifting means are necessarily provided for the bowl and must be on the outside of the bowl. Such lifting means as usually constructed, however, would interfere with the rotation of the bowl on account of contacting with the column and such lifting means, for instance handles, secured to the bowl would also rotate with the bowl, presenting an element of danger.

In order to avoid these objections, lifting means are provided which are automatically releasable from the bowl. (Figs. 1, 17 and 18). Thus seats 285 are fixed to the outside of the bowl and have sockets 286. A plate 287 is provided with a tongue 288 received in the socket and a shoulder 289 is arranged to contact the upper edge of the seat for limiting downward movement of the plate in the seat. A handle 290 is fixed to the plate. The upper edge of the plate is arranged to contact the outwardly curled bead 291 at the upper edge of the bowl. The upper edge of the plate is at its inner corner provided with a lip 292 received in the groove 293 at the inner edge of the bead next to the side wall of the bowl.

The plate is of a curvature corresponding approximately to the curvatures of the walls of the bowls of different diameters, having a mesne curvature which accommodates itself to the different curvatures of the bowls of different diameters within a suitable range.

The bowl is provided with a suitable number of seats for the handle. The larger bowl may be provided with four such seats for four handles and the smaller bowl is exemplified with two seats for two handles.

When it is desired to lift the bowl the lower tongues of the handles are inserted in the seats on the bowl and their upper edges moved under the bead. Upon lifting force being applied to the handles, the upper edges of their plates contact the bead, their tongues being still held within the slots in the seats. The handles are thus locked to the bowl while the bowl is off of its support. As soon as the bowl rests upon its support the upward strain upon the handles ceases and the handles may be readily removed from the bowl by tilting motion. The center of gravity of the handle lies outwardly from the bowl beyond its seat, and if the operator should forget to remove the handle, the handle will automatically drop off of the bowl by gravity. This insures the absence of the handle from the bowl upon rotation of the bowl.

Bowls of different diameters may be placed on the bowl-support, as exemplified by the larger bowl 35 and a smaller bowl 295. (Figs. 7, 8, 9 and 10). An adapter ring 301 is provided for the smaller bowl for seating the smaller bowl upon the bowl-support or within the larger bowl. When seated within the larger bowl there is a lower space 302 between the bottoms of the bowls and a side space 303 in the larger bowl surrounding the side wall of the smaller bowl. This space may receive a suitable tempering bath 304, which may be a heating bath or a cooling bath. When placed in either of these positions the top of the smaller bowl is substantially the same distance

above the bowl-support as the top of the larger bowl when supported on the bowl-support.

The adapter ring comprises seats 308, 309, of larger diameter at the outer periphery of the adapter ring, and a seat 310 of smaller diameter at the inner periphery of the adapter ring. The adapter ring is of tapering form between said seats as shown by the tapering reducing wall 311. An outer flange 312 of the adapter ring is provided with locking lugs 313 received in the locking slots 38, (Fig. 11), in the bowl-support for forming drive connection between the bowl-support and the adapter ring, when the adapter ring is placed on the bowl-support.

The seat 309 comprises an annular face received in the mouth of the bowl of larger diameter and an annular shoulder received upon the upper margin of the bowl of larger diameter. The friction engagement between said seat and the outer margin of the bowl of larger diameter forms driving connection between the bowl of larger diameter and the adapter ring.

The inner margin of the adapter ring is provided with grooves 315 and with lugs 316. The grooves extend lengthwise in the inner face of the ring and the lugs have seats 317 between them. The outer face of the bowl of smaller diameter is also provided with ribs 318 extending lengthwise of the axis thereof.

If the smaller bowl only is to be used, the adapter ring is placed with its end of larger diameter downward on the bowl-support and the smaller bowl is seated in the reduced end of the adapter ring, (Fig. 7), the ribs 318 being received in the seats 317 for positioning the smaller bowl at proper height and forming a driving connection between the smaller bowl and the adapter ring.

If the smaller bowl is to be placed within the larger bowl, the adapter ring is inverted and its outer margin seated in the mouth of the larger bowl. (Figs. 9 and 10). The smaller bowl is placed within the reduced end of the adapter ring, its ribs 318 being received in the grooves 315, and its seats 285 resting upon the shoulder 319 formed at the reduced end of the adapter ring. The connection between the ribs and the walls of the slots form driving connection between the adapter ring and the smaller bowl.

A scraper 325 may be provided for the inner walls of the bowls. (Figs. 1, 4 and 16). This scraper keeps the inner faces of the upright walls of the bowl clean and returns any portion of the mixture in the bowl which may adhere to said wall back into the mixture for causing uniform mixture of all of the ingredients. The scraper exemplified comprises a scraper blade 326 having a scraping edge 327. Straps 328 are fixed to the scraper blade. They surround and are received in annular grooves 329 in a depending rod 330, forming hinge connection with said rod. The rod is provided with a depending portion 331 and a laterally extending portion 332 connecting with the blade supporting portion of the rod. The depending portion 331 is slidable and rotatable in a bearing 333, shown as a clamp bearing, on a bracket 334 on the side wall of the column, a clamp screw 335 having a handle 336 thereon being arranged to clamp the scraper support in adjusted positions.

The laterally extending portion of the support permits the scraper blade to be moved inwardly and outwardly on an arc for being received against the inner face of the annular wall of the smaller bowl and against the inner face of the annular wall of the larger bowl. The scraper blade is swingable on its support for presenting its scraping edge in either direction so as to be presented toward the oncoming portion of the wall of the bowl regardless of its direction of rotation. The scraper blade may be beveled at both sides toward its scraping edge.

A spring 341 extends from a collar 342, to which it is secured. The outer end of the spring is received between lugs 343 on the upper end of the scraper blade. The collar is secured in adjusted positions on the rod 330, by a clamp screw 334, having a handle 345. When the scraper blade is at one side of the rod, the spring extends in one direction, and when the scraper blade is at the other side of the rod the spring extends in approximately the opposite direction. The action of the spring is to press the scraping edge toward the side wall of the bowl regardless of the direction in which the scraper blade extends or the size of the bowl in which it is received.

Means are provided for tempering the contents of the bowl and the bath 304. Thus tempering means shown as electrical heating elements 351, 352, 353, are located between the bowl support and the bottom of the bowl. (Figs. 5 and 11). The heating elements are supported on a spider 354, the hub 355 of which is supported at the upper end of the stud 29 and is suitably secured thereto. This spider comprises radiating arms which support the heating elements.

The heating elements are stationary between the bowl support and the bowl. They are mounted on the stationary stud 29. Electric conductors 356, 357, extend through the bore 32. The inner ends of the connections are secured to the respective ends of the heating elements and the outer ends thereof lead to a suitable source of heat supply. There may be a plurality of the electric heating elements alternately arranged upon the spider, and suitable switches for selectively energizing one or more or all of the heating elements are provided. This is assuming that an alternating current is used. Where a direct current is used a suitable rheostat may be provided for various heat conditions.

The inner ends of the electric conductors 356 connect with the respective heating elements at one of the ends of the latter and the inner end of the electric conductor 357 connects with the other ends of said heating elements. The electric conductors 356 respectively connect with electric switches 358 suitably placed as on the top of the column, and having suitable handles 359 extending to the outside of said top or canopy, to selectively heat the respective heating elements. (Figs. 1, 2, 3, 5 and 19).

A suitable electric conductor connects with the opposite poles of said switches. The latter conductor and the electric conductor 357 connect with a suitable source of electricity, one of them being led to a switch box 362 at the top of the column having a switch 363 for the heating elements and a switch 364 for the electric motor. (Figs. 1, 2 and 3).

The bowls are exemplified as having flat bottoms and straight sides and the mixing tools are so formed as to have portions (Fig. 5) which reach into the annular corners between said flat bottoms and straight sides.

In operation the ingredients for the mix are placed in the larger bowl 35 or the smaller bowl 295, the spindle 45 being in raised position, and a suitable whip or mixing tool 60 having been at-

tached to the spindle. The mixing tool is lowered by means of the handle 75.

A speed is selected which is proper for the beginning portion of the agitation of the mix, and the handle 192 having been pulled outwardly for releasing the clutch 125, the handle 201 is manipulated by inward or outward movement of the same or rotation of the same for selectively meshing the gears 151, 152, with the gears 161, 162, and selectively meshing the gears 168, 169, with the gears 177, 178, for obtaining the desired speed of operation.

The handle 192 is thereupon pushed inwardly, which has the effect of shifting the locking bar 221 for placing the interfering ridges 222, 223, selectively in the interlocking slots 225, 226, or 228, 229, (Figs. 13 and 21), for locking the gears in selected relations, the final portion of the inward movement of the handle 192 causing clutch engagement.

Clutch disengagement, different relations of gear meshing, and clutch reengagement are consecutively obtained for causing reduced or accelerated speeds of the mixing tool and the bowl. These changes are quickly obtained without bringing any of the parts to a common neutral position between speed changes and permitting transitions of speed change without detrimental delay and consequently without detrimental effect upon the dough or other mix.

The driving mechanism causes rotation of the spindle of the mix tool without changing its position and also causes rotation of the bowl, with the axis of rotation of the bowl arranged eccentric to the axis of rotation of the mixing tool. The rotations of the mixing tool and the bowl are preferably in opposite directions, but may be in similar directions, thus further increasing the speed ratios between the rotary mixing tool and the bowl.

All of the operating parts are maintained in engaging relations upon declutching of the clutch and the resistance of the mix applied to the mixing tool causes immediate cessation of rotations of all of the operating parts, permitting speed change to be effected quickly while these parts are non-rotative. Bowls of various sizes are arranged to be placed on the rotatable bowl support centrally with relation to the bowl support and to be held in driving relation with the bowl support.

Stationary tempering means for the rotating bowl are also provided, these tempering means being located between the rotatable bowl support and the rotating bowl for greatest heating or cooling effect upon the contents of the bowl.

The arrangement of rotating bowl and rotating mixing tool also permits stationary scraping means for the inside of the bowl to be provided, so as to maintain the inside of the bowl clean and insure mixing of all the ingredients in the bowl.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a mixing machine, the combination of a column casting comprising front and rear walls relatively closely spaced adjacent their lower ends and more widely spaced adjacent their upper ends, said lower portion of said front wall concave in shape in upright direction, side walls which connect the side margins of said front wall and rear wall, and a lower portion which extends forwardly to form a base; a forwardly extending canopy at the top of said column, a rotatable bowl-support on said base having an upright axis of rotation, a bowl on said bowl-support, a depending spindle in said canopy and having an upright axis of rotation eccentric to said upright axis of said bowl-support, and a rotatable mixing tool on said spindle rotatable in said rotatable bowl, portions of said rotatable bowl-support and of said bowl located in said concavity, and constructed and arranged whereby the inner portion of the working field between said rotatable mixing tool and said rotatable bowl is located in said concavity.

2. In a mixing machine, the combination of a column, a base at the bottom of said column provided with an upwardly extending stationary stud provided with a bore, a rotatable bowl-support on said base about said stud, said rotatable bowl-support provided with an upwardly opening hollow about said stud, a bowl on said bowl-support above said hollow, a heating element in said hollow, and a heating connection for said heating element in said bore.

3. In a mixing machine, the combination of a column having forwardly extending upright walls at its sides, a forwardly extending canopy at its top, and a forwardly extending base at its bottom, forming a forwardly opening recess between said upright walls, said canopy and said base, a rotatable bowl-support having an upright axis of rotation supported on said base and extending rearwardly into said recess between said forwardly extending upright walls, a depending spindle journaled in said canopy and having an upright axis of rotation eccentric to the upright axis of rotation of said bowl-support, means for supporting a plurality of bowls of different diameters on said bowl-support with their axes in coincident positions when on said bowl-support, driving means at the upper end of said column, an upright shaft between said canopy and said base at the side of said rotatable support, and a stationary tube about said upright shaft spaced from said column between said canopy and said base, said upright shaft having operative connection at its bottom with said bowl-support for rotating said bowl-support and said driving means having operative connections at said canopy with said spindle and the upper end of said upright shaft for rotating said spindle and said upright shaft.

4. In a mixing machine, the combination of a column, a forwardly extending canopy at its top, a bowl-support under said canopy, an axially movable sleeve depending to substantial distance below said canopy and having slide connection with said canopy, a depending spindle journaled in said sleeve and having an upright axis of rotation eccentric with said bowl-support, a rotatable mixing tool on the lower end of said spindle, means axially holding said spindle to said sleeve, and means for moving said sleeve axially whereby to move the lower end of said rotatable mixing tool toward and from the bottom of said bowl, said last-named means including a handle outside said canopy and connecting means inside the hollow of said canopy between said handle and said sleeve.

5. In a mixing machine, the combination of a column, a forwardly extending base at its bottom and a forwardly extending canopy at its top, a rotatable bowl-support journaled on said base with an upright axis of rotation, said canopy comprising a bearing, a shield supported by said canopy about said bearing, a depending spindle journaled in said bearing and extending through

said shield and having an upright axis of rotation eccentric to said upright axis of rotation of said bowl-support, a rotatable bowl on said bowl-support, a rotatable mixing tool on the lower end of said spindle, means for moving said spindle axially whereby to move the lower end of said rotatable mixing tool toward and from the bottom of said bowl, said last-named means including a handle outside said canopy and connecting means inside the hollow of said shield between said handle and said spindle, and adjusting means in the hollow of said shield adjusting the downward limit of movement of said spindle.

6. In a mixing machine, the combination of a column, a base at the bottom of said column, a rotatable bowl-support on said base having an upright axis of rotation, a plurality of rotatable bowls at different diameters, means for supporting said plurality of bowls concentrically on said bowl-support, a depending spindle at the top of said column, mixing tools on the lower end of said spindle respectively received in said respective bowls, said depending spindle having an axis of rotation eccentric to said axis of rotation of said bowl-support, a scraper having a scraping edge, and means for movably mounting said scraper selectively locating said scraper in different positions laterally for scraping contact of its scraping edge with the inner faces of the various concentric walls of said bowls of different diameters.

7. In a mixing machine, the combination of a column, a base at the lower end of said column, a rotatable bowl-support on said base having an upright axis of rotation, a depending spindle on said column having an upright axis of rotation eccentric to said upright axis of rotation of said bowl-support, a larger rotatable bowl, a smaller rotatable bowl, mixing tools adapted for said respective bowls, means selectively securing said respective mixing tools to the lower end of said spindle, and an adapter-ring having a plurality of circumferential resting parts of different diameters, said rotatable support and the mouth end of said bowl of larger diameter and the resting part of larger diameter of said adapter-ring provided with complemental resting faces for accommodating said resting part of larger diameter to said bowl-support and said mouth of said bowl of larger diameter, and the outer portion of said bowl of smaller diameter and the resting part of smaller diameter of said adapter-ring provided with a plurality of complemental resting parts for supporting said bowl of smaller diameter selectively on said adapter-ring placed in reversed upright positions.

8. In a mixing machine, the combination of a column, a base at the lower end of said column, a rotatable bowl-support on said base having an upright axis of rotation, a depending spindle on said column having an upright axis of rotation eccentric to said upright axis of rotation of said bowl-support, a bowl of larger diameter on said rotatable bowl-support, a bowl of smaller diameter in said bowl of larger diameter, and an adapter ring provided with concentric supporting parts at its outer and inner edges respectively coacting with said bowl of larger diameter and said bowl of smaller diameter supporting said bowl of smaller diameter in spaced relation from said bowl of larger diameter, and a heating element between said bowl-support and said bowl of larger diameter.

9. In a mixing machine, the combination of a column, a rotatable bowl spaced in close relation from the wall of said column, a depending spindle journaled in the upper portion of said column and having an upright axis of rotation eccentric to the axis of rotation of said bowl, and lifting means for said bowl comprising a plurality of seats affixed to the outer periphery of said bowl, said bowl provided with a ledge distanced in upright direction from said seats, and releasable handles provided at one end with tongues in said seats and at the other end with abutting portions for said ledge, said ledge provided with seats proximate to the walls of said bowl and said handle having a part received in said last-named seats when said handle is raised in lifting the bowl, the center of gravity of said handle being spaced from said bowl outside said seats and arranged for tippingly releasing said handle from said bowl by downward movement of said handle by gravity.

10. In a mixing machine, the combination of a rotatable bowl-support having an upright axis of rotation, a depending spindle above said bowl-support having an upright axis of rotation eccentric to the axis of rotation of said bowl-support, a plurality of bowls of different diameters and heights, an adapter-ring provided with concentric seating parts of different diameters and heights coacting with said rotatable bowl-support and said bowls of different diameters and heights, locating said various bowls with their axes of rotation coincident with the axis of rotation of said bowl-support and with their upper ends at substantially equal heights and their bottoms at different heights, rotatable mixing tools of different diameters and lengths, and means for releasably securing said rotatable mixing tools to the lower end of said spindle for coaction respectively with the side walls and bottoms of said respective bowls.

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