United States Patent [19]

Blasnik

[11] **3,744,767**

[45] **July 10, 1973**

[54] **ROTARY MIXER**

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[22] Filed: **Apr. 17, 1972**

[21] Appl. No.: **244,702**

[52] **U.S. Cl.** **259/117**
[51] **Int. Cl.** **B01f 7/16**
[58] **Field of Search** 259/116, 117, 118, 259/119, 120, 121, 122, 115, 125, 100, 62, 20, 38

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Primary Examiner—Robert W. Jenkins
Attorney—Maxwell James and Harold James

[57] **ABSTRACT**

A manually actuatable rotary mixer having a surprisingly simple and inexpensive construction is disclosed. The device includes a rotary mixing assembly driven by a reciprocating spiral shaft received within a hollow mixer shaft from which the mixing elements radially extend. The mixer shaft is mounted fast on a bearing member having a corresponding internal spiral surface and vertically supported on a retainer plate. The retainer plate is disposed between the mixing container and a cover member through which the actuating shaft extends and means are provided on the cover member for operatively threadedly securing it to the mixing container and for pressing the retainer plate into sealing engagement with the lip of the mixing container when the cover member is tightened thereon.

A compression coil spring between the retainer plate and the cover member is effective to return the actuating shaft to its upper position after manual depression thereof, thereby to effect a rapid alternate clockwise and counterclockwise rotation of the mixing elements within the container.

18 Claims, 8 Drawing Figures

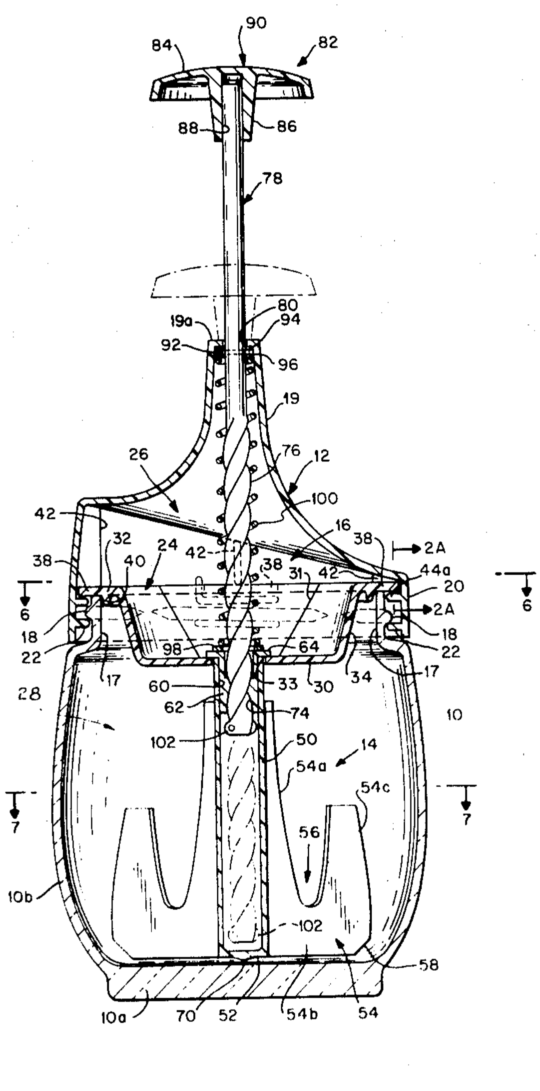


FIG. 1

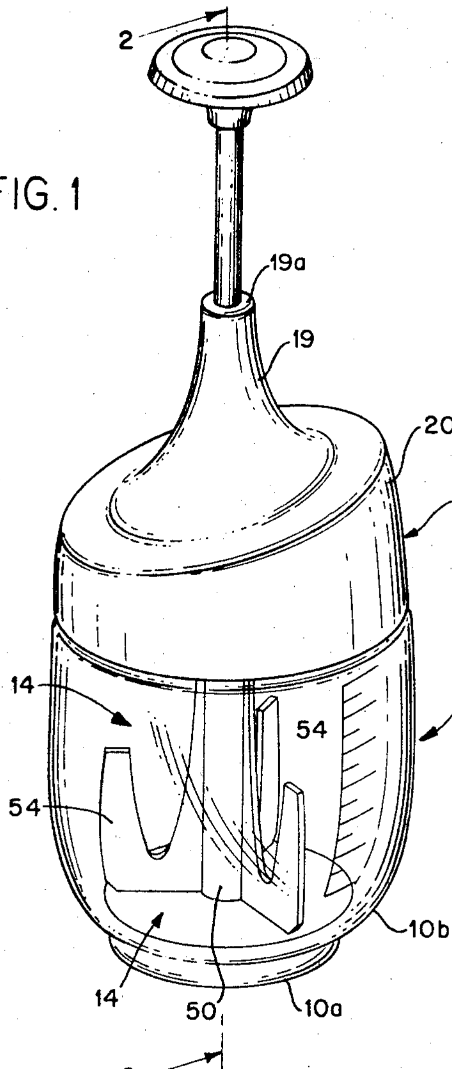


FIG. 3

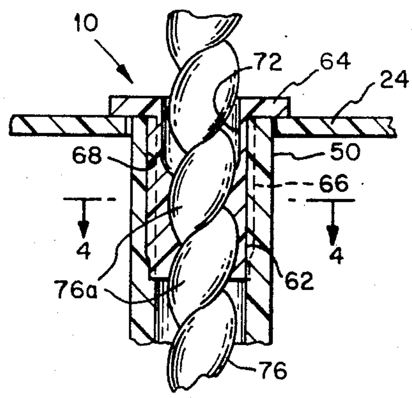


FIG. 4

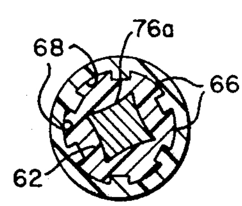


FIG. 5

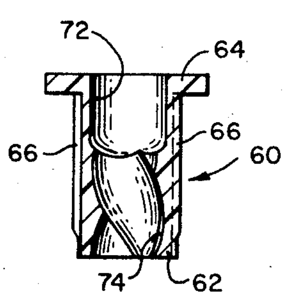
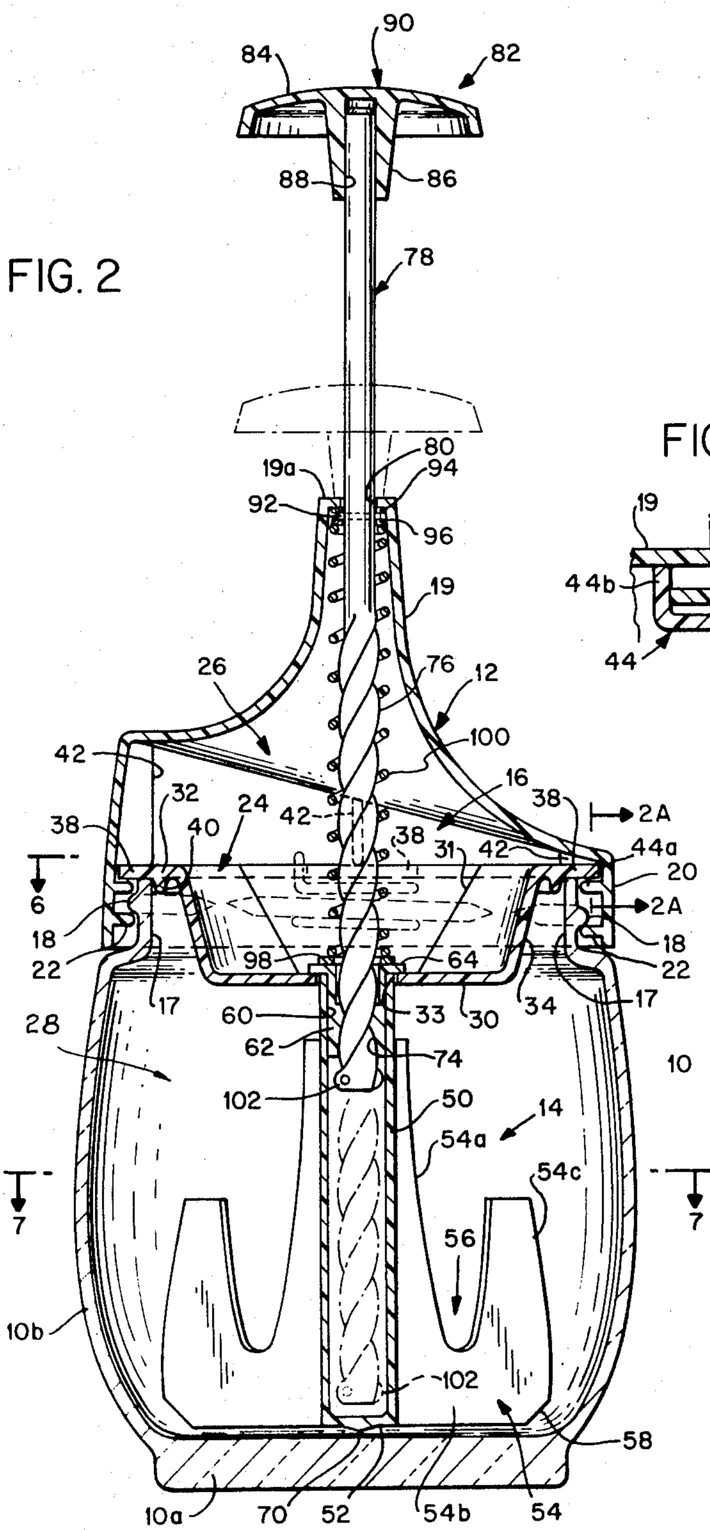


FIG. 2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84
82
88
86
78
80
19a
94
92
96
19
26
76
12
100
42
16
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2A
32
24
42
38
40
38
31
42
44a
20
6
6
18
2A
18
22
98
64
22
17
60
33
30
34
17
28
62
74
10
102
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54a
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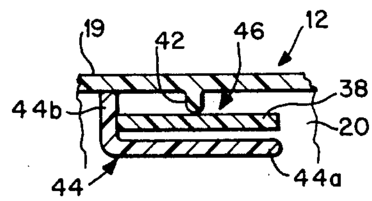
54c
7
56
10b
102
58
10a
70
52
54b
54

FIG. 2A


19
42
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44b
20
44
44a

FIG. 6

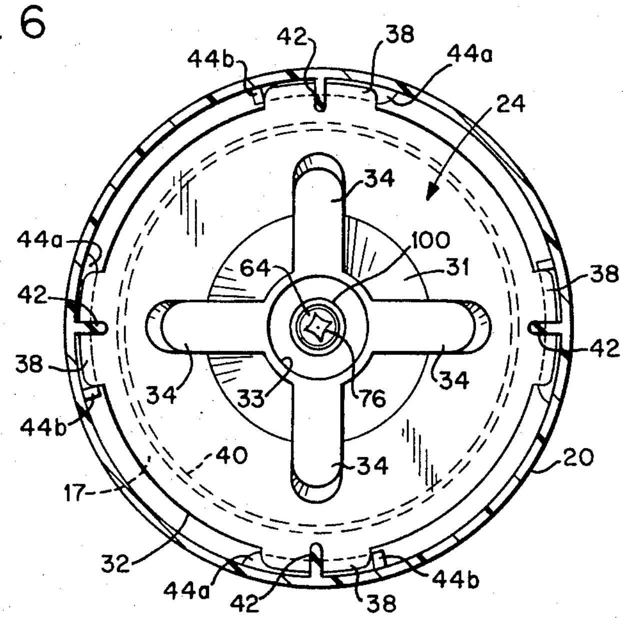
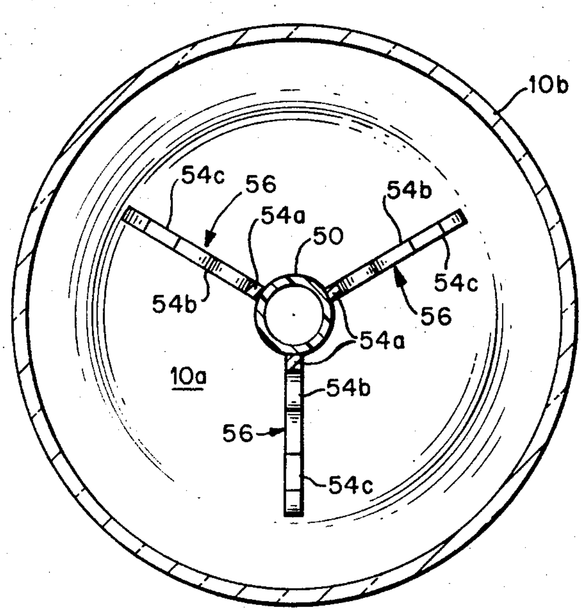

42
38
44b
44a
24
34
100
44a
64
31
42
38
42
38
34
33
76
34
34
44b
40
20
17
34
32
44a
42
38
44b

FIG. 7


10b
54c
56
54b
54a
50
54b
54c
56
54a
10a
54b
56
54c

ROTARY MIXER

This invention relates to rotary mixers and more particularly to a manually actuatable rotary mixer or blender of the type used in food preparation.

As the art of cooking has advanced in recent years, the use of food mixing and blending mechanisms has steadily increased. Today a rotary mixer or blender is regarded as a necessary cooking aid not only for the professional cook but also for home use. The variety of food mixing or blending operations called for in today's popular home cooking recipes requires mixers or blenders having a variety of speeds and operating characteristics.

While the modern electrically operated high speed rotary mixer or blender is quite versatile, there are many blending and mixing operations which are not satisfactorily performed by such mechanisms. These include operations in which the contents must be relatively slowly agitated to a subtly defined consistency and/or in which the consistency is preferably primarily controlled by the "feel" of the operator. Moreover, in some cases it is desirable to continuously vary the speed of mixing in response to such "feel." Indeed, many serious cooks consider food preparation an art in which high speed electric mixers or blenders are laboratory type instruments unsuitable for food preparation because they are relatively unresponsive to the artistry of the cook.

However, for most mixing operations manual agitation with a hand held utensil may be equally unsuitable as a result of the time and manual effort which is generally required. As a result, manually actuatable rotary food mixers are still quite popular among many cooks. These devices represent a compromise between the undesirable insensitivity and lack of control of the high speed electric blender actuated by the flick of the switch and the equally undesirable time consumption and fatigue involved in the tedious process of manual mixing with a hand held utensil.

Various styles and types of manually actuatable mixers have been available for many years. Mechanisms of this type generally comprise a mixing element assembly actuated by a rotatable or reciprocating actuator and adapted to be hand held over a container with the mixing assembly extending downwardly into the contents to be mixed. These devices, however, have many drawbacks, perhaps the most important of which are the problems of slippage and fatigue. It is often difficult to stabilize the mixer unit over the container particularly when the food products being mixed are viscous. As a result, substantial effort must be expended to maintain the container and the mixing unit in operative relationship for effective mixing action.

A second disadvantage of these prior art devices is that they are not designed for use with containers of any particular size, shape or depth. While this provides versatility, it often contributes significantly to the problems of slippage and fatigue.

Moreover, devices of this character are generally limited by the physical capabilities of the user to very low speeds. Where high speed capability has been attempted, the resulting mechanisms have been found to require unduly large amounts of manual pressure on the actuating means to overcome the high torque ratio with a resulting loss of adequate speed control and an increase in slippage and fatigue.

Finally, commercially available devices of this type, while substantially less expensive than electric blenders, are generally unduly complex, expensive to manufacture and prone to failure.

It is a primary object of the present invention to provide a food mixing device of the manually actuatable type which eliminates substantially all of the problems of prior art mixers of this type.

It is yet another object of the present invention to design a rotary mixer of the type described which is adapted for releasable sealing attachment to a mixing container.

It is yet another object of the present invention to provide a manually actuatable rotary mixer including an improved reciprocating drive mechanism which provides effective rotary mixing action at high speeds approaching that of electric mixers with a minimum of fatigue.

It is still another object of the present invention to design a rotary mixer of the type described which is easy to operate inexpensive to manufacture and assemble, and provides a particularly effective versatile mixing action for a variety of food products.

To these ends, the present invention comprises a manually actuatable rotary mixer having a simple and inexpensive construction yet being surprisingly effective for its intended purpose. Briefly, that construction comprises a cover member and a mixing container releasably secured to one another. A retainer plate is releasably secured to the cover member and means are provided for bringing that retainer plate into sealing engagement with the lip of the mixing container when the device is assembled.

A rotary mixing means in the form of a hollow shaft having radially extending mixing elements is vertically supported on the retainer plate and extends substantially fully into the mixing container. The actuating member comprises a shaft extending through the cover member and having a knob or handle on its outwardly extending end. The other end of the actuating shaft is externally threaded in a spiral configuration and is received within the hollow mixing shaft. That hollow shaft is provided with an internal low friction bearing member internally threaded for driving engagement with the actuating shaft. The actuating shaft is spring biased to an upper position by means of a concentric coil spring compressed between the retainer plate and a washer mounted concentrically on the actuating shaft and forced upwardly into engagement with a radial projection thereon.

The device is operated by a simple reciprocating motion of the actuator shaft. Thus, when the shaft is pushed downwardly against the bias of the compression spring, the threaded engagement between the spiral threads on the actuating shaft and the internally threaded bearing member is effective to convert the axial movement of the actuating shaft into a rotary movement of the hollow mixer shaft thereby to rotate the mixing elements within the container. The downward end of the stroke is defined by the engagement of a shoulder of the actuating knob with the cover member. Upon release of the pressure on the knob, the compression spring is effective to force the actuating shaft upwardly to its initial position thereby to rotate the hollow mixing shaft and the radially extending mixing elements in the reverse direction. The upper end of the stroke is defined by the engagement of the spring biased washer with the underside of the cover member.

In a preferred embodiment of the invention, the mixer shaft extends through an aperture on the retainer plate and is supported in depending relation therefrom by a radially projecting flange or lip on the bearing member engaging the upper surface of the retainer plate. The bearing flange is maintained in substantially sealing relationship with the retainer plate during the operation of the actuating shaft by the action of the aforementioned compression spring which engages a washer seated on that flange. As a result, the lower or mixing chamber is sealed by the retainer plate and food particles are prevented from entering the upper chamber defined between the retainer plate and the cover member.

The retainer plate is preferably detachable from the cover member and may be moved downwardly on the actuating shaft for cleaning but the actuating shaft is preferably deformed at its lower end to prevent the assembly from completely detaching when removed for cleaning.

To the accomplishment of the above, and to such other objects as may hereinafter appear, the present invention relates to a manually actuatable rotary mixer as defined in the appended claims and as described herein with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of the rotary mixer of the present invention;

FIG. 2 is a cross sectional view of the rotary mixer of FIG. 1 taken generally along the line 2—2 of FIG. 1;

FIG. 2A is an enlarged fragmentary cross sectional view taken along the line 2A—2A of FIG. 2;

FIG. 3 is an enlarged fragmentary side elevational view partly in section of the threaded bearing and spiral shaft assembly of the rotary mixer of FIG. 1;

FIG. 4 is a cross sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is an enlarged cross sectional view of the spiral bearing of FIG. 3;

FIG. 6 is a cross sectional view taken along the line 6—6 of FIG. 2; and

FIG. 7 is a cross sectional view of the rotary mixer assembly taken along the line 7—7 of FIG. 2.

The rotary mixer of the present invention is best illustrated in FIGS. 1 and 2 and comprises a mixing container or jar generally designated **10**, a cover member generally designated **12** operatively secured to container **10**, a rotary mixer assembly generally designated **14** received within the container **10** and a reciprocating drive mechanism generally designated **16** operatively connected to the rotary mixing assembly **14** and slidably received within cover member **12**. As best shown in FIG. **2**, container **10** is shaped in the form of a conventional jar having a bottom **10**a and a cylindrical slightly outwardly bowed side wall **10**b and is provided with a recessed lip **17** externally threaded at **18** for lockingly receiving a conventional threaded cap or cover. Cover member **12** is generally shaped in the form of an angularly truncated inverted funnel **19** having a top wall **19***a* and a generally cylindrical base portion **20** and is provided internally on base portion **20** at its lower edge with threads **22** adapted to operatively lockingly threadedly engage the corresponding threads **18** on the external surface of the lip **17** of the container or jar **10**. Accordingly, in the assembled condition, the cover member **12** is threadedly secured to the jar **10**, its lower cylindrical base portion **20** being substantially coterminous with the outer cylindrical side wall **10**b of container **10** as shown in FIG. **1**.

A retainer plate generally designated **24** is disposed between the cover member **12** and the container **10**, thereby to separate the resulting enclosure into an upper chamber **26** and a lower mixing chamber **28**. Retainer plate **24** is formed with a downwardly projecting central portion **30** and a peripheral flange **32**. As best shown in FIG. **6**, portion **30** is formed in the shape of a truncated cone **31** having four radially projecting fingers **34** and is provided with a central aperture **33**. As again best shown in FIG. **6**, the retainer flange **32** has an outer diameter approximately equal to the outer diameter of container rim **17** and is provided with a plurality of radially projecting tabs **38** (here shown as four) extending substantially to the inner surface of the cylindrical base portion **20** of cover member **12**. In addition, retainer plate **24** is provided at its undersurface with a downwardly extending circular rib **40** having a diameter slightly less than that of the inner surface of container lip **17**, whereby the retainer plate **24** may be centered on the lip **17** and when forced downwardly thereon may be brought into sealing engagement therewith.

As best shown in FIG. **2A**, cover member **12** is provided internally on its cylindrical base portion with four radially inwardly extending vertical ribs **42** (see also FIG. **6**). Centered below each vertical rib **42** and vertically spaced therefrom is a generally L-shaped rib **44** comprising a horizontally extending support portion **44***a* and a stop portion **44***b* vertically extending upwardly from support portion **44***a*. The other end of support portion **44***a* is open and defines together with rib **42** a slot **46** adapted to receive tab **38** (see FIG. **2A**). Accordingly, the retainer plate **24** may be operatively secured to the cover member **12** merely by inserting that retainer plate upwardly against the vertical ribs **42** with the tabs **38** spaced between consecutive L-shaped ribs **44** and thence gripping the fingers **34** and turning the cover member a quarter of a turn counterclockwise (as viewed in FIG. **6**) to slide the tabs **38** into operative engagement with the vertical stop portion **44***b* of the L-shaped rib **44**, whereupon the tabs **40** of retainer plate **24** are vertically supported on horizontal support ribs **44**a, respectively. When so supported, the retainer flange is slightly vertically spaced below vertical ribs **42**, the slot **46** being slightly larger than the thickness of tabs **38**. However, upon screwing cover member **12** onto container **10**, the under surface of flange **32** engages the top edge of rim **17** of the container, the circular rib **40** engages the internal vertical wall of rim **17**, and as the cover member is tightened on container **10**, the tabs **38** are lifted off support ribs **44***a* and the flange **32** engages vertical ribs **42** at its upper surface, those ribs being effective to press the flange **32** and rib **40** into good sealing engagement with the rim **17** of the container.

Referring again to FIG. **2**, the operative rotary mixer assembly comprises a hollow shaft **50** having an open top end received within the central aperture **33** in retainer plate **24**. The bottom end of shaft **50** is closed by end wall **52**. The shaft **50** is provided with a plurality of mixing elements, here shown as three mixing blades **54**, formed integral therewith and extending radially outwardly thereof in equally spaced relationship.

Mixing blades **54** are here shown with a particular contour adapted to provide a desirable smooth and uniform mixing action within the lower mixing chamber **28.** As illustrated the blades are generally U-shaped and include a generally narrow inner arm **54*a*** radially projecting from shaft **50** along substantially its entire operative length, a base portion radially extending from the bottom end of shaft **50** with its lower edge coterminous with end wall **52** and slightly spaced above the bottom wall **10*a*** of the container, and an outer arm **54*c*** extending upwardly from base portion **54*b*** approximately half way to the retainer plate **24.** The opposing edges of arms **54*a*** and **54*c*** are gracefully flared downwardly toward each other to define a curved crevice **56** at the upper edge of base portion **54*b*.** The outer edge of the arm **54*c*** extends virtually to the base of the side wall **10*b*** of the container and is preferably formed with a bevelled surface **58** at its intersection with the lower edge of the base **54*b*.**

The thus contoured blade provides effective uniform rotary mixing action for most food products. The blades **54** and shaft **50** may be molded in one piece of a light weight durable plastic, thereby to reduce the necessary drive torque for high speed rotary action. Upon rotation of the shaft **50** the blades **54** engage and move through the food particles in the container driving them radially outwardly against the side wall **10b** of the container and upwardly against the retainer plate **24,** the particles thence falling back onto the arcuate crevice edge **56** of the blades for thorough and uniform mixing action.

The mixing assembly **14** is supported on retainer plate **24** by means of a bearing member generally designated **60.** As best shown in FIGS. **4** and **5,** bearing member **60** comprises a hollow cylinder **62** having a flange **64** projecting radially outwardly at its upper end. The cylinder **62** is generally circular with an outer diameter approximately equal to the inner diameter of hollow shaft **50** and is provided with a plurality of radially outwardly projecting vertical splines **66.** Those splines are adapted to be received within corresponding vertical keyways **68** formed on the internal surface of hollow shaft **50** (see FIG. **4**) at its upper end and extending downwardly a distance at least equal to the length of splines **66.**

As best shown in FIG. **3,** the lower end of the bearing member **60** is inserted into the open upper end of the hollow shaft **50,** the splines **66** being received within keyways **68,** and pressed downwardly until the flange **64** engages the upper end of shaft **50.** The parts are dimensioned for press-fit engagement so that shaft **50** is vertically suspended and rotatably keyed to bearing **60.** During assembly this press-fit engagement is effected after shaft **50** is received through central aperture **33** in retainer plate **24.** Accord- ingly, in the assembled condition retainer plate **24** is captured on the upper end of shaft **50** between the overhanging bearing flange **64** and the upper end of the blade arms **54.** Upon securing the retainer plate **24** to the cover member **12** as described above, the bearing flange **64** engages the upper surface of the plate **24** at the edge of aperture **33** (see FIG. **3**) and thus the bearing member **60** and mixer assembly **14** are vertically supported on and suspended from the retainer plate.

The depth of container **10** is such that in the assembled condition the blade assembly extends downwardly into the container to a depth only slightly spaced from the lower wall **10*a*** of the container. In order to prevent the lower edges of the blades **54** from engaging the bottom of the container, a small downwardly extending projection **70** may be provided on the end wall **52** of the hollow shaft **50.**

The hollow cylinder **62** of bearing member **60** is counterbored at its upper end at **72** and is internally threaded at **74** to threadedly receive the threaded lower end **76** of an actuating shaft **78.** The other end of shaft **78** extends through an aperture **80** in the top wall **19*a*** of the cover member **12** and is provided with a knob generally designated **82.** As best shown in FIG. **2,** knob **82** comprises a generally horizontal (rounded) portion **84** and a downwardly projecting stud **86** having a bore **88** receiving the upper end of shaft **78** in press-fit relationship. Accordingly, as shaft **78** is moved downwardly by manual pressure on handle **82** in the direction of arrow **90** the externally threaded portion **76** on the lower end of the shaft operatively drivingly engages the internally threaded portion **74** of bearing **60** to rapidly rotate the bearing in a counterclockwise direction as viewed in FIG. **6.**

As best shown in FIGS. **3** and **4,** the threaded portion **76** of shaft **78** is preferably defined by a quadrate spiral. As best shown in FIG. **4,** the spiral shaft portion **76** is generally square in cross section, its side surfaces **76*a*** being slightly arcuately bowed inwardly and that cross section being rotated continuously for approximately two complete revolutions along the full length of the threaded section **76** to form a spiral. The threaded bearing section **74** has a corresponding spiral inner surface and accordingly the bearing **60** makes approximately two complete revolutions counterclockwise for a full downward stroke of shaft **78.**

The lower end of that stroke is defined by the engagement of the stud **86** on handle **82** with the upper wall **19*a*** of the cover member **12** as illustrated in the broken line position of FIG. **2.** As the spiral portion of the shaft **76** moves downwardly through bearing **60** it is received within the hollow shaft **50,** the stroke of actuating shaft **78** preferably being terminated with the lower end of the spiral portion **76** spaced from the lower wall **52** of the hollow shaft **50.**

Spaced slightly above the upper end of the spiral portion **76** of shaft **78** within upper chamber **26** is a pin **92** extending through the shaft **78** and radially outwardly thereof. That pin **92** is disposed between a pair of washers **94** and **96,** respectively, mounted concentrically on shaft **78** below the upper wall **19*a*** of cover member **12.** A lower washer **98** is disposed concentrically on the spiral portion **76** of shaft **78** directly above the flange **64** of bearing **60.** A compression coil spring **100** is compressed between the washers **96** and **98** thereby to urge the pin **92** and thus the shaft **78** upwardly to the solid line position illustrated in FIG. **2,** washer **94** engaging the underside of the upper wall **19*a*** of cover member **12.** Accordingly, as the shaft **78** is moved downwardly by pressure on handle **82** in the direction of arrow **90,** pin **92** and washer **96** are effective to compress coil spring **100,** that coil spring being effective to return the shaft to the upper solid line position of FIG. **2** upon releasing the pressure on the handle **82** thereby to automatically rotate the mixing assembly **14** in the opposite (clockwise) direction (as viewed in FIG. **6**) to complete one reciprocating cycle of the shaft **78.**

In addition to automatically providing a return stroke, coil spring **100** is also effective to maintain the bearing flange **64** firmly engaged against the upper surface of retainer plate **24** thereby to maintain the lower mixing chamber **28** substantially sealed. At the same time, the flange **64** must rotate first in one direction and then in the other on the upper surface of retainer **24.** Accordingly, that bearing member **60** is preferably made of a low friction synthetic material which provides a minimum of frictional resistance not only between the flange **64** and the retainer plate **24** but also between the spiral thread **76** on shaft **78** and its corresponding internally threaded surface **74.** As a result, surprisingly little resistance to the downward stroke of shaft **78** is encountered and even a simple pressure engagement on the horizontal portion **84** of handle **82** by the palm of the hand is effective to prevent the shaft **78** itself from rotating, thereby to positively rotatably drive the mixing assembly. Moreover, the spring **100** need be only moderately stiff in order to rapidly and effectively return the shaft **78** to is upper solid line position as illustrated in FIG. **2.**

In order to prevent the mixer assembly **14** from detaching from the shaft **78** when it is removed for cleaning (as hereinafter described), the lower end of that shaft is deformed at **102** so as to act as a stop member not threadedly received through bearing member **60.**

The rotary mixer described above is surprisingly inexpensive to manufacture and assemble. Thus, in addition to the mixing assembly **14,** the retainer plate **24,** the cover member **12** and the knob **82** may all be molded in a convenient assembly line process from a relatively inexpensive but durable plastic. Moreover, the parts need not be manufactured to any particularly close tolerance since the sealing function of the retainer plate both at the rim of the container and at the central aperture **33** thereof is accomplished by positive pressure of the vertical ribs **42** and the compression spring **100** respectively. Thus, the opening or slot **46** between the vertical ribs **42** and the horizontal support ribs **44***a* on the cover member **12** (see FIG. 2A) need only be larger than the thickness of tabs **38** on the retainer plate, those vertical ribs **42** automatically pressing the retainer flange **32** into sealing engagement with the container rim **17** upon tightening of the cover member. Likewise, the central aperture **33** in retainer plate **24** may be substantially larger in diameter than the outer diameter of shaft **50** provided it is smaller than the diameter of the sealing flange **64** on bearing member **60.**

The mixer is conveniently assembled as follows: The bearing member **60** is received on the upper ends of shaft **78** and screwed downwardly onto the spiral portion **76** thereof. The upper end of the shaft **50** is inserted through the aperture **33** in retainer plate **24** and then the bearing member **60** is inserted into the hollow at the upper end of shaft **50** and press-fit therein whereby the retainer plate **24** is captured between the flange **64** and the upper edges of blade arms **54***a.* Next, washer **98,** spring **100** and washer **92** are mounted concentrically on shaft **78,** spring **100** is slightly compressed by pressure on washer **96** and pin **92** is inserted through the shaft above washer **96.** Washer **94** and the cover member **12** are then mounted on shaft **78** in the operative relationship illustrated and the knob **82** is thereafter press fit on the upper end of the shaft. The resulting structure is retained in one piece, the parts all being retained on the drive shaft **78** between the deformed lower end **102** and the knob **82.** Accordingly, the user need not be burdened with assembling and disassembling the device each time it is used.

In operation the food contents are merely placed in the mixing jar **10,** the retainer plate **24** is screwed into operative position on the cover member **12** by turning a quarter of a turn as described hereinbefore and the cover member is screwed onto the jar to the position illustrated in FIG. **2.** The speed of mixing is controlled by the rate of depression of the reciprocating drive shaft. For normal cleaning, the user need not detach the retainer plate **24** from the cover member **12** but merely cleans the underside of the retainer plate. An occasional cleaning of the underside of the bearing flange **64** and the upper surface of the retainer flange **32** may be accomplished simply by unscrewing the retainer plate from the cover member and moving it downwardly against the upper edges of the blade arms **54***a.* The mixed contents may be stored in the same container **10** by securing a conventional screw-on cover thereto, which cover may be provided with the mixing unit.

The low cost of manufacture and surprising effectiveness of the rotary mixer herein described offers the consumer an attractive and useful food preparation aid at a cost far below that of devices of comparable effectiveness.

While only a single embodiment of the present invention has herein been specifically described, it will be appreciated that many variations may be made therein without departing from the scope of the invention, as defined in the following claims.

I claim:

1. A manually actuatable rotary mixer comprising a mixing container adapted to receive the contents to be mixed, a cover member, means on said cover member for removably securing it to said container, separate retainer means disposed between said container and said cover member and defining with said container and cover member a lower mixing chamber and an upper chamber, rotary mixing means vertically supported on said retainer means and extending into said container, manually actuatable reciprocating drive means operatively connected to said rotary mixing means, slidably received in said cover member for movement between first and second positions and effective in response to sliding movement thereof to rotatably drive said mixing means within said mixing chamber, and means on said cover member engaging said retainer means and effective to produce sealing engagement of said retainer means with said container when said cover member is secured to said container.

2. The rotary mixer of claim **1,** wherein said rotary mixing means comprises a hollow shaft extending into said container and having a plurality of radially extending mixing elements, wherein said cover member is provided with an aperture and wherein said drive means comprises an externally threaded drive shaft having one end extending through said aperture in said cover member and its other end received within said hollow shaft and means on said hollow shaft threadedly engaging said drive shaft, whereby when said threaded drive shaft is moved downwardly into said hollow shaft said mixing means is rotated in a given direction.

3. The rotary mixer of claim **2,** wherein said drive shaft engaging means comprises bearing means having a main body portion received within said hollow mixing shaft at one end thereof and a flange engaging said one end of said hollow shaft and extending laterally therebeyond, said retainer means comprising a retainer plate having an aperture receiving said hollow mixing shaft and vertically supporting said mixing means by engagement with said bearing flange.

4. The rotary mixer of claim **3**, wherein said hollow shaft is press fit onto said cylindrical bearing portion, and means keying said bearing member to said hollow shaft for rotary movement together.

5. The rotary mixer of claim **3**, wherein said drive shaft further comprises a deformed portion at the lower end thereof below said bearing means thereby to prevent said lower end of said drive shaft from moving through said bearing means.

6. The rotary mixer of claim **2**, wherein said externally threaded drive shaft comprises a quadrate spiral.

7. The rotary mixer of claim **6**, wherein said drive shaft engaging means comprises bearing means having a main body portion received within said hollow mixing shaft at one end thereof and a flange engaging said one end of said hollow shaft and extending laterally therebeyond, said retainer means comprising a retainer plate having an aperture receiving said hollow mixing shaft and vertically supporting said mixing means by engagement with said bearing flange.

8. The rotary mixer of claim **1**, wherein said container has a rim having an upper edge and an inner wall and wherein said retainer means comprises a flange, and means on said cover member effective when said cover member is secured to said container to operatively engage said retainer flange and press same into sealing engagement with the upper edge of said container rim.

9. The rotary mixer of claim **8**, wherein said retainer flange further comprises a vertically depending rib extending into said container and adapted to sealingly engage said inner wall of said container rim when said retainer flange is pressed into sealing engagement with the upper edge of said container rim.

10. The rotary mixer of claim **9**, wherein said cover member comprises a cylindrical side wall and wherein said flange pressing means comprises a plurality of vertical ribs radially inwardly projecting from said cylindrical side wall of said cover member.

11. The rotary mixer of claim **8**, wherein said rotary mixing means comprises a hollow shaft extending into said container and having a plurality of radially extending mixing elements, wherein said cover member is provided with an aperture and wherein said drive means comprises an externally threaded drive shaft having one end extending through said aperture in said cover member and its other end received within said hollow shaft and means on said hollow shaft threadedly engaging said drive shaft, whereby when said threaded drive shaft is moved downwardly into said hollow shaft said mixing means is rotated in a given direction.

12. The rotary mixer of claim **11**, wherein said drive shaft engaging means comprises bearing means having a main body portion received within said hollow mixing shaft at one end thereof and a flange engaging said one end of said hollow shaft and extending laterally therebeyond, said retainer means comprising a retainer plate having an aperture receiving said hollow mixing shaft and vertically supporting said mixing means by engagement with said bearing flange.

13. The rotary mixer of claim **12**, wherein said retainer flange further comprises a vertically depending rib extending into said container and adapted to sealingly engage said inner wall of said container rim when said retainer flange is pressed into sealing engagement with the upper edge of said container rim.

14. The rotary mixer of claim **8**, further comprising means on said cover member vertically supporting said retainer flange in a position spaced below said flange pressing means whereby upon securing said cover member to said container, said retainer means is lifted from said supporting means by said container rim and pressed into sealing engagement with said container rim by said flange pressing means.

15. The rotary mixer of claim **14**, wherein said retainer flange further comprises a vertically depending rib extending into said container and adapted to sealingly engage said inner wall of said container rim when said retainer flange is pressed into sealing engagement with the upper edge of said container rim.

16. The rotary mixer of claim **15**, wherein said cover member comprises a cylindrical side wall and wherein said flange pressing means comprises a plurality of vertical ribs radially inwardly projecting from said cylindrical side wall of said cover member.

17. The rotary mixer of claim **14**, wherein said rotary mixing means comprises a hollow shaft extending into said container and having a plurality of radially extending mixing elements, wherein said cover member is provided with an aperture and wherein said drive means comprises an externally threaded drive shaft having one end extending through said aperture in said cover member and its other end received within said hollow shaft and means on said hollow shaft threadedly engaging said drive shaft, whereby when said threaded drive shaft is moved downwardly into said hollow shaft said mixing means is rotated in a given direction.

18. The rotary mixer of claim **17**, wherein said drive shaft engaging means comprises bearing means having a main body portion received within said hollow mixing shaft at one end thereof and a flange engaging said one end of said hollow shaft and extending laterally therebeyond, said retainer means comprising a retainer plate having an aperture receiving said hollow mixing shaft and vertically supporting said mixing means by engagement with said bearing flange.

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