United States Patent [19]

Voglesonger

[11] **3,785,579**

[45] **Jan. 15, 1974**

[54] **LIQUIDIZER SAFETY CLUTCH**

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[22] Filed: **Mar. 27, 1972**

[21] Appl. No.: **238,385**

[52] **U.S. Cl.** **241/282.1,** 259/108

[51] **Int. Cl.** **B02c 18/12**

[58] **Field of Search** ..... 192/89 R, 89 A, 129 A, 192/130; 259/108, DIG. 26; 241/272, 282.1, 282.2, 199.12, 46.17

[56] **References Cited**

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[57] **ABSTRACT**

Safety release clutch for two part liquidizer container in which the cutter clutch member that is journalled in the lower part is resiliently retracted from engagement with the motor clutch member when the upper part is separated from the lower part for cleansing either one or both parts. In its retracted position the cutters may be locked against relative rotation or permitted to rotate free of the drive clutch member, but in either event there is no projection of elements below the lower part whether the two parts are assembled or not.

17 Claims, 5 Drawing Figures

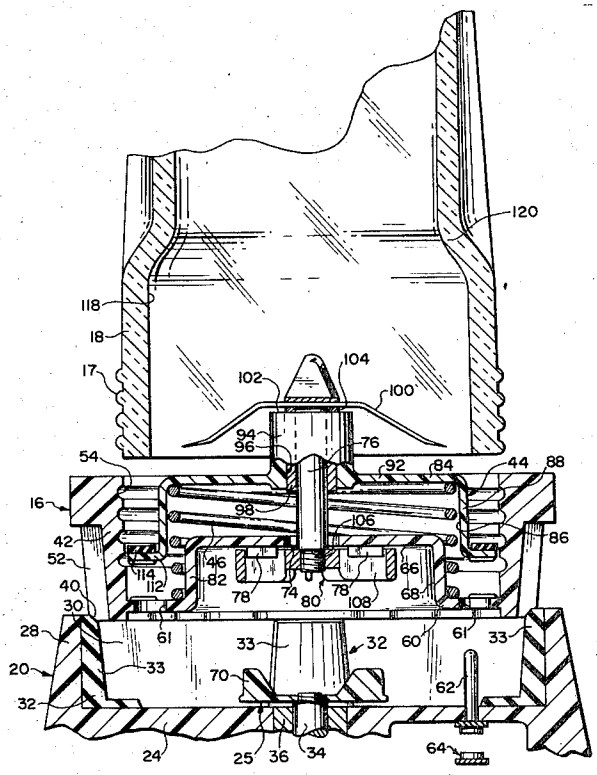

FIG. 1

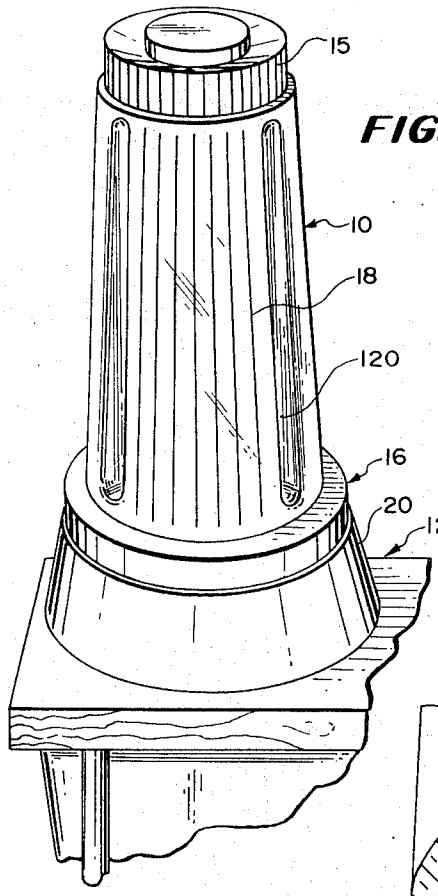
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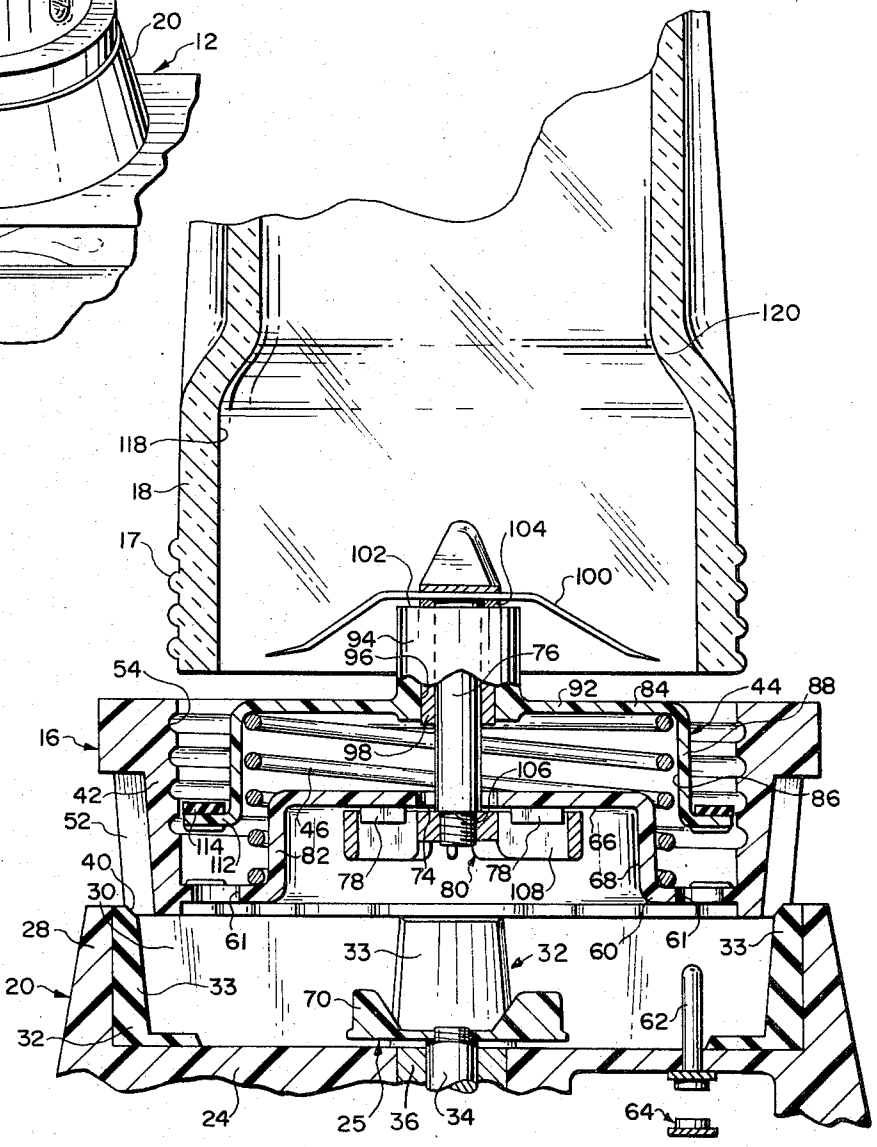
FIG. 2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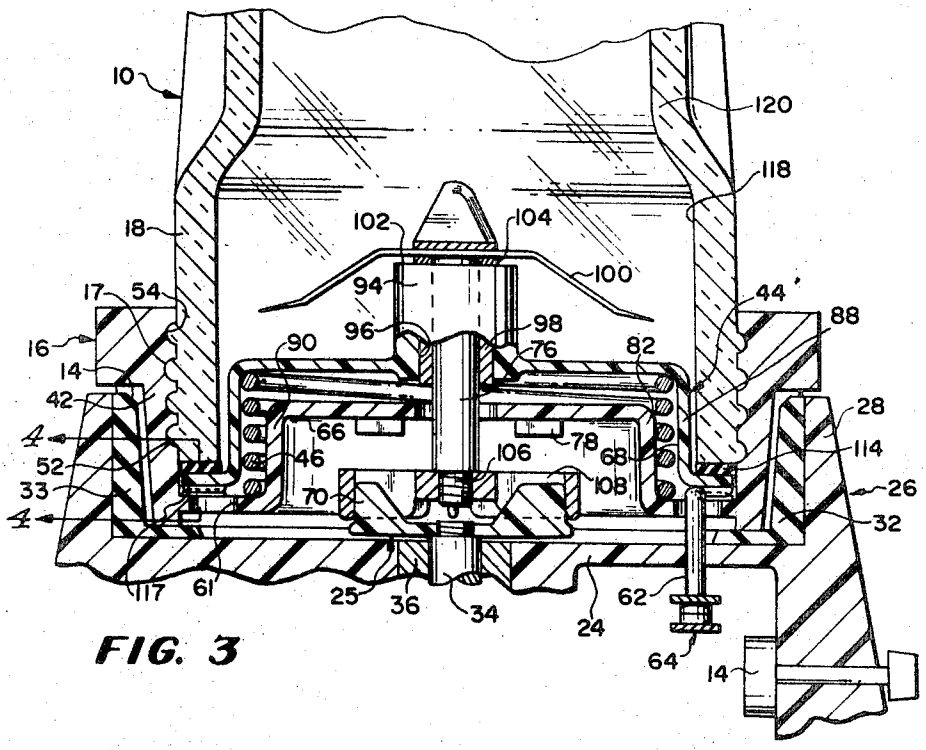

FIG. 3

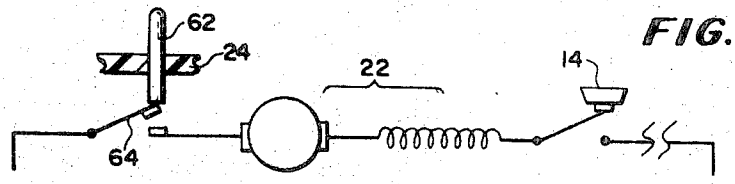

FIG. 5

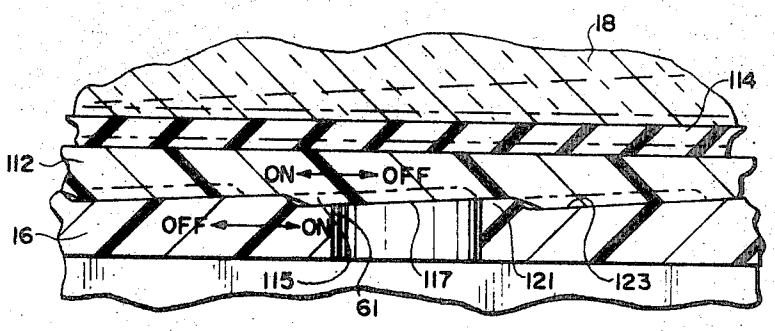

FIG. 4

LIQUIDIZER SAFETY CLUTCH

BACKGROUND OF INVENTION

Referring to the co-owned Emmons U.S Pat. No. 3,612,126, containers for home use liquidizers are generally provided with high speed cutters carried by a vertical shaft that is journalled in its bottom wall and driven by a clutch member on its lower end. A jar portion surrounding the cutters has side walls tall enough therabove to discourage a user from manually reaching in far enough to contact the cutters during operation.

There are two types of containers. One is a molded unitary jar with a downwardly opening cavity on the bottom concealing the driven clutch member that is disengaged by removal of the jar; and the other is a two-piece container having a threaded connection between a jar and bottom member at approximately the level of the cutters. The cutters are journalled in the base member.

Several advantages are attained by the use of a two part liquidizing container. The base and jar portions can be more easily and better cleaned when separated; freedom of design for specialized operation is afforded; and, when desired, different upper portions can be used interchangeably with the base portion, including jars that are narrow or closed at the top. On the other hand, dangers are created for the user with a base portion having exposed cutters when the jar is removed. Not only does the remote possibility still exist that the user might reach into the container and contact the cutters, but with the jar portion removed, the base portion alone, with the cutters openly exposed, can be left on or be returned to the power unit and the cutter clutch element becomes engaged with the motor driven clutch member. The user may unthread the jar portion while retaining the container on the power unit so that the power unit can be used as a wrench on the base portion in manually unthreading them; or, after unthreading the two parts the base portion may be put back in drive position on the power unit to avoid misplacement for either temporary or prolonged storage without the user disconnecting the plug-in power cord from the house current; or, the base portion can be set on the power unit in a random position in contact with the clutch drive member.

In any event the power switch can be closed thoughtlessly, accidentally or prankishly, and the series wound motor which has high initial torque and high-speed characteristics with a fast start can either fling the base portion as an animated missile, or almost instantly whirl the cutters at such a speed that they are not likely to be seen by a person reacting quickly to turn off the motor. Also intentional use of exposed cutters for any purpose is to be discouraged.

Heretofore the base assembly as a unit alone, without the weight of the jar, has been raised out of its clutch engaging position on a power unit to disengage the clutch members when the jar alone is removed. However, in doing this, a lifter element in the assembly is resiliently projected downwardly below to base assembly and engages only the power unit but also any table top on which it is set with and without the jar mounted in place. The danger of marring a table top or unwittingly tipping the container can be greatly reduced by making the projectable member of a plastic, or redesigning to locate the clutch engagement level higher in the base

of the container. Space in this area is at a premium cost-wise even though safety is to be served.

Other endeavors to protect users against injury from the cutters if the power unit is inadvertently energized with or without the jar removed from the base member in drive position include devices in which weight actuated safety cut-off switches have been employed, or the clutch elements are left in engagement and rotation is prevented under a dangerous or damaging locked motor condition, which with a flexible clutch connection, can flip the base portion and provide a dangerous missile.

SUMMARY OF INVENTION

In the present invention the relative movable clutch elements are disposed in a cavity in the bottom of a bottom assembly member where engagement and disengagement takes place within the height of the bottom assembly. The bottom assembly includes a threaded ring member which defines the cavity, a closure member disposed within the ring member to journal a shaft carrying the cutters at its top, and the driven member threaded on the lower end confines the excursion of the closure member and clutch member to approximately the height of the cavity. A coiled spring interengages the ring and closure members for purposes of declutching and retracts the driven clutch member remotely to the top of the cavity. The spring is overcome when the jar portion is threaded back into position on the ring member into sealed relationship with the closure member, and this returns the driven clutch member to its clutch engaging position.

Preferably locking elements are carried by the closure member at the top of the cavity to lock with the driven clutch member and prevent its rotation when it is declutched. Also, a normally open safety switch is preferably connected in series with the main power switch with its control button disposed to be depressed by the closure means in its lower position when the container is in sealed relationship therewith.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a liquidizer embodying the preferred embodiment of the invention;

FIG. 2 is an enlarged vertical sectional view showing the jar and bottom portion of the two piece container assembled and mounted in working position on a power unit with the clutch members in driving engagement;

FIG. 3 is a view similar to FIG. 2 showing the relationship and relative positions of the base portion and power unit with the two portions separated, the clutch members disengaged, and the bottom portion left on the motor unit; and

FIG. 4 is an enlarged sectional view, taken along line 4-4 of FIG. 3, showing the anti-loosening sealing engagement of the jar and closure means;

FIG. 5 is a schematic circuit associated with the embodiment of FIG. 3.

THE PREFERRED EMBODIMENT

Referring now to FIG. 1 in further detail, a liquidizer is illustrated having a multi-part container **10** supported on a power unit **12** that is controlled by a manual switch **14** (FIG. 3). As shown in FIG. 2 the container **10** includes a bottom assembly **16** removably threaded to the upper jar portion **18** as at **17** and may be closed at the top by a suitable removable cap **15.**

The power unit **12** includes a housing **20** provided with a series wound motor **22** (FIG. **5**) supported therein concentrically with a top wall **24** that has a collar means **26** thereon. The wall **28** of the collar (FIGS. **2** and **3**) defines a recess **30** having four angularly spaced resilient L-shaped inserts **32** which serve as lugs **33** that receive the bottom assembly **16** in weight bearing and non-rotative relationship.

The upper end of the vertical shaft **34** of the motor **22** is journalled in a bearing **36** located in the center of the recess **30** on the wall **24** and carries a clutch drive element **25.** The upper ends of the lugs **33** are beveled as at **40** to guide the bottom assembly **16** when lowered into place.

The bottom assembly **16** is made up of a ring member **42,** a closure member **44** and a compression spring **46.** The ring member **42** has an outer wall **48** whose outer surface **50** is provided with eight vertical flutes **52** to receive the four lugs **33** vertically in any one of eight predetermined non-rotative positions that are upwardly and readily releasable in that both elements taper slightly in a downward direction. The wall **48** inwardly defines a coarse female thread **54** and preferably tightens in the direction of cutter rotation. The lower wall **58** of the ring member **42** is a spider **60** having eight openings **61** that are oriented with respect to the flutes **52** to receive the push button **62** of a switch **64** extending through them in each of the eight positions, as later described. The hub **66** of the spider **60** defines a cavity **68** having a depth as much as twice the height of the clutch teeth **70** on the clutch drive element **25.** The upper wall **72** of the cavity **68** has an opening **74** therethrough to receive the cutter shaft **76** and preferably is provided with depending lock lugs **78** engaged by the driven clutch member **80** when in its uppermost position in the cavity (FIG. **3**). The wall **82** of the cavity serves as a guide for the spring **46.**

The closure member **44** comprises a main circular member **84** provided with a cavity **86** centrally in it receiving the elements defining cavity **68** and of the same depth but with space between their telescoping walls **88** and **82** to accommodate the spring **46.** At the center of the upper wall **92** of the cavity **86** a boss **94** is provided having a vertical opening **96** therethrough in which a sintered metal sleeve bearing **98** is press fitted to journal the driven cutter shaft **76** which carries the cutter **100** at the upper end in a conventional manner against a shoulder **102** with a running seal washer **104** between the bearing **98** and cutters **100.** The lower end of the shaft **76** is shouldered as at **106** to cooperate with the upper shoulder **102** for axial support of the shaft and the cutters and the driven clutch member **80** thereon. The adjacent ends of the motor drive and driven cutter shafts **34** and **76** are shouldered and threaded to receive engaging clutch members **25** and **80,** the driven clutch member **80** having rigid radiating spokes **108** interdigitating with the circularly arranged resilient teeth **70** of the drive clutch member **25.** The spokes and teeth are offset whereby their drive faces are on true radii and are movable into and out of engagement with each other within the depth of the cavity **68.** Outwardly of the lower edge of the cavity wall **88** a radial flange **112** is provided which carries on its upper surface a neoprene washer **114** coextensive with the outer edge of the flange which coacts with the centering guide **56** to center the closure assembly with respect to the lugs **32.**

The jar **18** is preferably made of glass so that it can withstand being washed in a dishwasher at a high temperature. The inner wall **118** of the jar tapers upwardly with the clover leaf flutes **120** preferably radially higher at the bottom than at the top for thorough turbulent movement of the jar contents with respect to the cutters **100.**

As shown in FIG. **4,** whether or not the threads **17** lead in a direction against possible loosening of the jar **18** in the ring member **42** under the hydraulic influence of the swirling contents of the jar, it is to be noted that in lieu thereof or in combination therewith the ring member **42** and closure member **44** may be lightly "latched" when tightened. They are preferably made of molded plastic and engage in face-to-face contact. The sealing washer **114** is resiliently compressible to augment the separation effort of the spring **46** upon the closure member **44** and ring member **42,** and, although a releasable spring detent and ratchet relationship may be provided between the ring and closure members that opposes a relative loosening movement between them, it has been found that several cam protrusions **115** on the bottom face **117** of the flange **112** concentrically coacting with elements **121** on the ring member **42** that may be mating cam protrusions on the upper face **123** of the ring member provide a substantial holding force against hydraulic loosening.

The mating cams define circumferentially elongated, slidably contacting surfaces inclined with the lead of the threads **17** in the direction of tightening and terminate in steeper inclines that oppose tightening whereby once tightening is being accomplished there terminally follows a further movement at that tightness that tactually provides a definite feeling that full tightening has been reached. Thereafter there is no quick loosen-ing under vibration and hydraulic torque of container contents.

In the opposite direction, manual unscrewing a predetermined distance of the two parts is followed by a feeling of quick release. The thickness and resiliency of the seal is related to this result to provide the camming action described for the last couple increments of movement. The height of each cam is approximately **0.005** inch, and, as noted, the incline of the faces **117** and **123** is that of the threads **17.**

In operation, assuming the parts described are in their assembled relation as shown in FIG. **2** and a liquidizing operation has been completed and the parts touched by the ingredients are to be cleansed, reference is made to FIG. **3.** The jar **18** is unthreaded for separate handling, the spring **46** is thereby released and lifts the closure member **44** to move the driven clutch member **80** upwardly to disengage with the drive clutch member **25** and engage the locking elements **78** against rotation. The ring member **42** and the closure member **48** are thereby separated far enough for cleansing liquid to move freely in and around all parts and through spider openings **61** for a thorough cleaning with or without the sealing washer **114** being removed.

In event the jar **18** is stored separately and the bottom assembly **16** of the ring member **42** and closure member **44** are placed back upon the power unit for storage the button **62** of the safety switch **64** is not actuated by the closure member, the clutch members **25** and **80** are disengaged and the cutters **100** are locked against rotation for the sake of safety if and when the lower portion of the container is stored on the power

unit without the jar attached. Moreover, the jar **18** can be loosely rested on the ring member **42** and the end turns of the coarse threads will weight support the jar without actuating the safety switch **64**. Moreover, with the switch button **62** being located towards the center of the top wall **24** of the power unit it is not likely that it will be contacted by the ring member **32** if resting askew, and if such happened the clutch members would be in declutched relation by their relative remoteness.

Accordingly, if the main switch **14** happened to be closed under any of these circumstances several safety factors are protective against personal injury. The drive clutch **25** being above the upper wall **24** of the power unit **12** would serve with the cavity **86** as a guide to locate the ring member **42** in its working position with the cutters **100** remaining locked, and, the closure member **44** is out of contact with the safety switch button either because of the spring **46** or the button **62** would only be received in a spider opening **61** with the closure member **44** remote from it, or the ring member **42** cannot touch the button because of non-alignment of the lugs **32** with the grooves **52** which establishes alignment. Thus, inadvertent injury to users is minimized when the two container parts are separated for improved cleansing conditions including both parts being cleanable in a dishwasher, if desired.

What is claimed is:

1. A liquidizing container having an opening at its base for receiving a rotatable liquefying cutter unit therethrough comprising,
- an open bottom jar member having a rim,
- a ring member receiving the bottom end of the jar in axial supported relationship around said rim,
- a closure member having a radial peripheral flange thereon defining a marginal shoulder facing the lower end of the jar,
- a sealing gasket disposed between said shoulder and rim,
- said ring member axially receiving the closure member and having a lower wall portion engaging said closure member to compress said sealing gasket between said flange and said rim,
- resilient means between said closure member and ring member urging said closure member upwardly when said ring member and jar member are separated for cleaning purposes, and
- cutter means journalled in said closure means and including on its lower end a driven member supported for relative axial movement when assembling and separating said closure and ring members.

2. The combination called for in claim **1** in which the ring member has a recess in the bottom thereof, and
- said driven member reciprocates in the recess on the bottom of the base member above the plane of its lower extremity and being held in working position by the jar assembled in place.

3. The combination called for in claim **2** in which said recess comprises a cavity having a wall spaced a predetermined distance above the upper face of said driven member with said jar assembled on the base member, and
- said closure member has a cavity with a wall defining a space between the vertical walls receiving said resilient means in guided relation.

4. The liquidizing container called for in claim **1** in which said ring member has a cavity accommodating said driven member at its spring retracted position of said axial movement, and
- locking means disposed between said driven member and said cavity wall interengaged by relative movement induced by said resilient means.

5. The liquidizing container called for in claim **1** in which said ring member and closure member have surfaces in face-to-face contact for locating said driven member in its operative position, and
- said sealing gasket being resilient and being free to turn with the gasket and jar rim when tightening.

6. The liquidizing container called for in claim **5** in which the surfaces in said face-to-face contact include rotatively interengaging axial elements at least one of which has an incline upstream of its tightening motion.

7. The liquidizing container called for in claim **5** including rotatively interengaging axial elements of a minimized axial dimension on said surfaces to locally pass each other under resilience remaining in said sealing gasket under hand tightened assembly, of said ring member and closure member.

8. In a liquidizer a container comprising a threadably engaged jar and a removable bottom assembly,
- said bottom assembly comprising,
- bottom closure means for said jar,
- resilient sealing means disposed between said bottom closure means and the lower end of said jar,
- ring means threadably engaging the lower end of said jar in a tightening direction and including an element engaging said closure means to compress said sealing means in sealing relationship,
- said element and the bottom closure having interface rotatably actuated cam elements placing pressure upon said sealing means as the ring means is tightened, one of said cams having the incline on it of said threadable relationship.

9. A liquidizer comprising,
- a power unit having a housing member,
- a container having a bottom assembly whose lower end is removably supported on the housing member, and
- a rotatable drive clutch member rotatably supported on the housing member and extending above said lower end when the bottom assembly is supported thereon,
- said bottom assembly including
  - a. a ring member having a cavity therein accommodating said drive clutch member and an opening centrally of said cavity, and
  - b. a closure member comprising a cutter carrying shaft journalled therein extending through said opening and a driven clutch member on the lower end of the shaft axially reciprocable in said cavity to engage and disengage said drive clutch member,
- resilient means between said ring and closure members urging disengagement of said clutch members, and
- cutter protective means interengaging said ring and closure members to counteract said resilient means and move said closure member axially with respect to said ring member and said housing member to engage said clutch members.

10. The liquidizer defined in claim **9** in which said cutter protective means is a liquidizing container having an opening at its bottom, a sealing means between said container and closure member, and elements sur-

rounding said opening interlocking with said ring member for placing said sealing means under compression.

11. The liquidizer defined in claim **9** in which said ring member has a wall defining external locating guides spaced with equal angularity therearound and a spider defining openings angularly spaced at angles equal to those of said guides,

angularly locating means carried by said housing member having elements mating with said guides in a miscellany of various relative orientations, and

safety switch means having a button so constructed and arranged with respect to said mating elements to extend through at least one of said openings and be engaged by said closure member in its lowermost position when said locating means and guides are in mating relation.

12. A liquidizer comprising a power unit controlled by a manual switch having a housing with a motor supported beneath an upper wall thereof,

collar means on said wall defining a recess having a plurality of angularly spaced lugs around it,

a motor shaft journalled in said housing and carrying a drive clutch element above the top wall within the configuration defined by said lugs,

a bottom assembly including,

a. a ring member having a cavity means therein accommodating said drive clutch member and flutes on its outer wall surface engaging said lugs in centering relation and securing means on its inner wall surface,

b. a closure member received within said inner wall surface journalling a cutter shaft carrying cutters on its upper end and a driven clutch member on its lower end disposed reciprocably in said cavity coaxially with said drive clutch member to engage and disengage said drive clutch member with relative movement of the closure member,

c. resilient means between said ring member and closure member urging disengagement of said clutch members, and

cutter enclosing means releasably interengaging said closure member and securing means to overcome said resilient means and move said closure member axially with respect to said ring member and said housing member to engage said clutch members.

13. The liquidizer called for in claim **12** in which said ring member has openings in its bottom wall around said cavity providing physical access therethrough to said clousre member from below.

14. The liquidizer called for in claim **12** in which said closure means has a recess receiving said cavity means, said cavity means and recess defining a depth above said upper wall that is at least equal to the overall axial displacement of said clutch members when disengaged with the ring member in place in said collar means.

15. The liquidizer called for in claim **12** in which said driven clutch member has radially spaced elements exposed on its upper sides and the top wall of said cavity has stop elements engaged by said spaced elements to lock said driven clutch against rotation during clutch disengagement.

16. The liquidizer called for in claim **13** including a safety switch carried by said upper wall and having a button located to engage said closure member through one of said openings during the time the clutch members are in engagement.

17. In a liquidizer container comprising threadably engaged jar and removable bottom assembly,

said container having vertical ribs on its inner surface having a radial height at their lower ends greater than at their top ends and terminating a spaced distance above their lower end,

bottom closure means for said container journalling cutter means in said jar immediately below said lower ends,

resilient means engaging the lower end of said jar, and

cam means between said resilient means and said bottom closure means to vary the compression on the resilient means progressively in steps during relative rotation between said bottom closure means and said jar.

* * * * *