United States Patent

[11] 3,612,126

[72] Inventors **Robert J. Emmons**
Manchester;
Maurice P. Samuelian, West Hartford, both of Conn.

[21] Appl. No. **850,182**
[22] Filed **Aug. 14, 1969**
[45] Patented **Oct. 12, 1971**
[73] Assignee **Dynamics Corporation of America**
New York, N.Y.

[54] **LIQUIDIZER SAFETY CLUTCH**
14 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** ..... **146/68 A,** 259/108, 192/89, 192/130
[51] **Int. Cl.** **B02c 18/12,** A47j 43/042
[50] **Field of Search** ..... 146/68.1, 68; 259/108, DIG. 26; 192/129 A, 130, 89

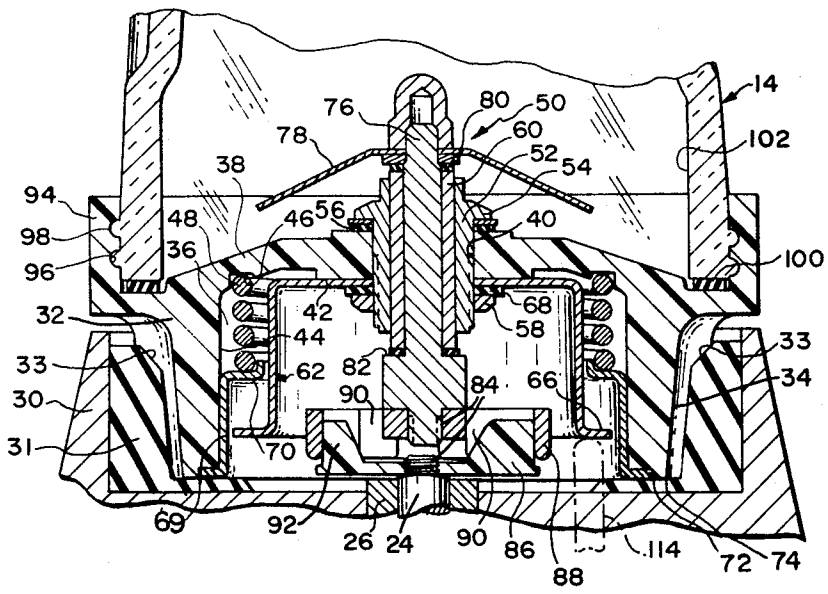
[56] **References Cited**

UNITED STATES PATENTS

2,356,004	8/1944	Price	259/DIG. 26
2,930,596	3/1960	Waters	259/108 X
3,172,441	3/1965	Hartwig et al.	146/68 A

Primary Examiner—Willie G. Abercrombie
Attorney—Harbaugh and Thomas

ABSTRACT: Liquidizer safety ejection clutch in which a resilient element operatively disposed between two axially engageable clutch elements yields under the combined weight of a jar and base of a two-piece container placed in working position to permit the clutch members to engage yet holds the clutch elements apart under the weight of the base alone to prevent operation of the exposed cutters when the jar is absent from the base.



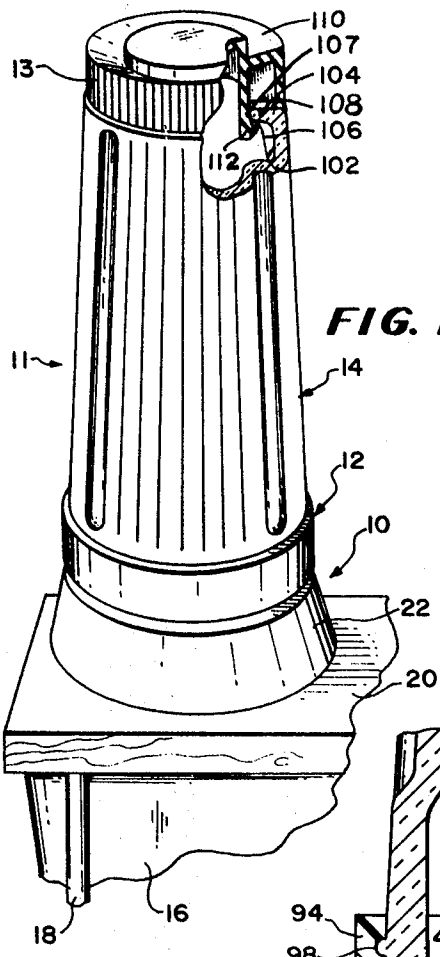


FIG. 1

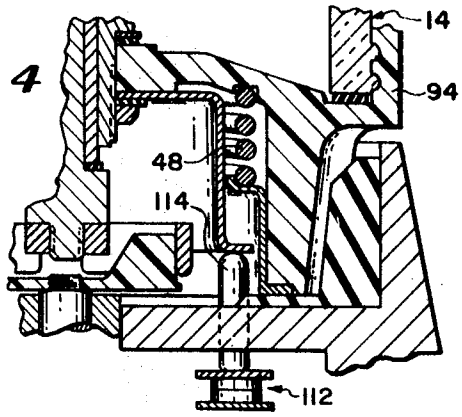


FIG. 4

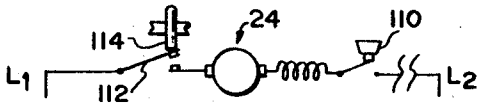


FIG. 5

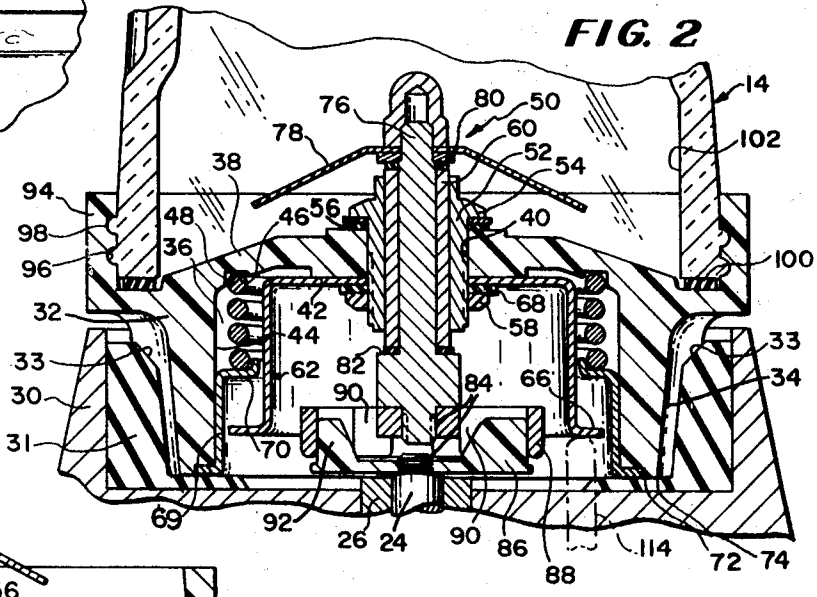


FIG. 2

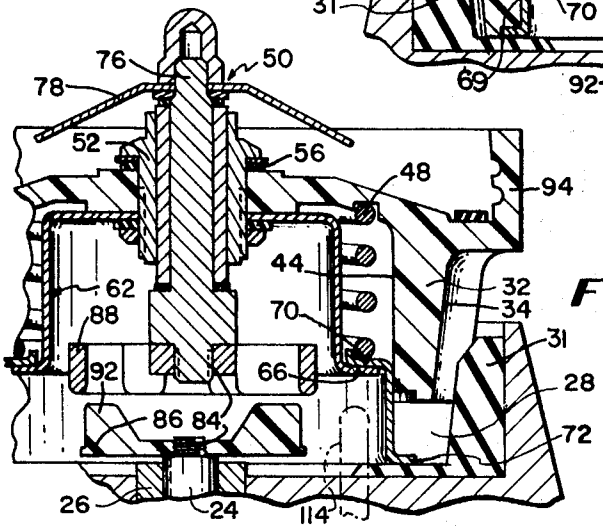


FIG. 3

INVENTORS:
ROBERT J. EMMONS
MAURICE P. SAMUELIAN
By Harbaugh & Thomas
Attorneys

LIQUIDIZER SAFETY CLUTCH

RELATED APPLICATION

Raymond—Ser. No. 780,131, filed Nov. 29, 1968 now U.S. Pat. No. 3,540,234

BACKGROUND OF THE INVENTION

Liquidizer containers for home use are generally provided with a vertical shaft in the bottom carrying high speed cutters with convoluted walls tall enough thereabove to discourage a user from manually contacting the cutters during operation.

There are two types of containers, one a molded single unit jar with a downwardly opening cavity on the bottom concealing the disengageable clutch mechanism, and the other a two-piece container having a threaded connection below the level of the cutters that are journaled in the base. When disconnected the base and upper portions can be easily cleaned separately and different upper portions can be used interchangeably with the base portion if desired.

A further danger is created for the user with the two-piece container. Not only can the user reach into the container and contact the cutters but the base portion without the jar portion can be left on the power unit with the clutch engaged and the beaters exposed as a result of any one of a number of actions of the user. The user may unthread the jar portion while retaining the container on the power unit so that the power unit can be gripped instead of the base portion in manually unthreading them; or, after unthreading the two parts the base portion is put back in drive position on the power unit for either temporary or prolonged storage without the user disconnecting the plug-in power cord from the house current.

In either event the speed control switch can be closed thoughtlessly, accidentally or prankishly, and the series wound motor which has high torque, 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.

SUMMARY OF THE INVENTION

In the present invention means are provided to disengage liquidizer clutch members when the protective presence of the jar portion of the container is absent and the base portion journaling the cutters is left in drive position with the cutters exposed. A resilient element is employed capable of differentiating between the applied weights of the base alone and the composite weight of the base and jar secured together.

More particularly, resiliently extendable members disposed between the motor housing and the container, and carried by either one or both of them operate to displace the base and thereby disengage the clutch members when the jar portion of the container is absent. The extendable members are comounted as part of the clutching arrangement so that their removal dismantles at least one of the clutch elements. Also, they are not adversely affected if they too are submerged in water at the time the cutters are being cleaned if mounted on the container.

The invention is further characterized by a two part liquidizer container having a light plastic base and preferably a jar portion made of a ceramic, such as glass, for many advantageous reasons including its weight factor and cleansability.

The invention further contemplates an added safety arrangement where not only are the clutch members disengaged when the upper container portion is absent, but the electrical power circuit to the motor also may be interrupted.

Another object of the invention for safety reasons is the provision of a removable upper container portion which tapers upwardly to an opening too small for a person's hand to be received therethrough, but with a wide opening at its lower extremity that provides easy access for thorough cleaning when removed from the base portion. Also the taper greatly assists circulation and return of the contents to the center of the container when swirled up the sidewall by the cutter action. Furthermore, convolutions on the container wall can be greatly reduced in radial height to provide greater capacity in the container.

These being among the objects of the invention other and further objects and advantages will appear from the following drawing and description relating thereto.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view partly cut away at the top of the container of a liquidizer embodying the preferred embodiment of the invention;

FIG. 2 is an enlarged cross-sectional view showing the upper and lower portions of the assembly of the two-piece container 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 clutch members disengaged when the upper portion of the container is absent;

FIG. 4 is a view similar to FIG. 3 showing the con-joint operation with a safety cut-off modification providing dual safety; and

FIG. 5 is a schematic of the circuit portion involved with the embodiment of FIG. 4.

Referring now to FIG. 1 in further detail, a liquidizer is illustrated having a power unit 10 supporting a container 11 assembly of a base member 12 removably receiving an upper or jar portion 14 closed at the top by a closure 13.

The power unit includes a housing 16 supported on legs 18, with a series wound motor 24 (FIG. 5) supported therein below a switch panel platform 20 that has a collar 22 thereon. The wall 30 of the collar (FIGS. 2 and 3) defines a cavity 28 having four angularly spaced resilient L-shaped inserts which serve as lugs 31 which receive the base in weight bearing and nonrotative relationship and the upper end of the vertical motor shaft 24 is journaled in a bearing 26 located in the center of the bottom of the recess 28. The upper ends of the lugs 31 are beveled as at 33 to guide the base when lowered and it will be noted that without the base 12 on it the lower end of the jar 14 can rest on the upper ends of the lugs within the rim of the wall 30 if it is stored alone at any time.

The base member 12 has a depending wall 32 whose outer surface 34 is provided with eight vertical grooves to receive the lugs 31 vertically in readily releasable nonrotative engagement in that both taper slightly in a downward direction.

The wall 32 inwardly defines a cavity 36 below the cross wall 38 having a flat surface 42 surrounding a bearing receiving opening 40 therethrough that is coaxial with the shaft 24. The sidewall 44 of the cavity is cylindrical and is bordered by a circular groove 46 at the top thereof which receives the upper end of a helical compression spring 48.

The cutter assembly 50 received in the opening 40 includes a sleeve 52 received through the opening 40 having a radial flange 54 adjacent its upper end that rests on the upper face of the cross wall with a washer gasket 56 therebetween. The lower end of the sleeve 52 receives an inverted cup member 62 thereon against the flat surface 42 and is terminally threaded to receive a washer 68 and nut 58 thereon for holding the sleeve and cup tightly in place in sealed relationship.

The cup member 62 is marginally provided with a flare-flange 66 whose marginal edge is located close to the cylindrical wall 44, and a circular sleeve 69 telescopes between the flange 66 and cylindrical wall 44. The circular sleeve has at the top thereof an inwardly directed flange 70 which supports the lower end of the spring 48 and engages the flange 66 for limited downward movement and the lower end of the sleeve is provided with an outwardly flared flange 72 which engages the bottom edge 74 of the base member 30 when the spring 48 is compressed. A lost motion of a predetermined distance is thus provided for the sleeve between engagement between

flanges 66 and 70 and engagement between flange 72 and said bottom edge 74. The lower face of the flange 70 is downwardly convex and smooth to avoid marring any surface finishes contacted by it.

Preferably, the body of the base member 12 is made of plastic material for the sake of lightness of weight and is not too heavy to prevent elevating the base member by the spring 48 the lost motion distance as determined by the engagement of flanges 66 and 70. A plastic found to be suitable as an acrylonitrile-butadiene-styrene (ABS)-type polymet such as the proprietary known as Cycolac.

A sintered metal sleeve bearing 60 is press-fitted in the sleeve 52 and journals a driven shaft 76 which carries cutters 78 at the upper end in a conventional manner with a running washer seal 80 between the bearing 60 and cutters 78. The lower end of the shaft 76 is shouldered as at 82 for axial support of the shaft and adjacent ends of the drive and driven shafts 24 and 76 are threaded as at 84 to receive cooperating clutch members 86 and 88, respectively, as more particularly described in said Raymond application, which is incorporated by reference herein.

It is sufficient at this time to note that the driven element is a rigid member having radiating spokes 90 offset their thickness enough that their drive faces are on true radii, and the drive element has circular arranged axially extending resilient teeth 92 interdigitating with the spokes 90. They are axially moved into and out of engagement with each other within the distance of said lost motion determined flanges 70 and 72 are explained.

Surrounding the cutter assembly 50 the base member is provided with a circular flange 94 preferably having coarse thread grooves 96 thereon mating with external thread lands 98 around the lower rim of the jar 14 where the jar portion has its widest opening for cleaning purposes. A gasket 100 seals the joint when the threads are tightened.

The jar is preferably made of glass so that it can withstand being washed in a dish washer at high temperature. It thus has substantial weight, which when added to that of the base member will collapse the spring 48 to permit the drive and driven members to engage. The inner wall 102 of the jar tapers upwardly where it terminates in an inwardly directed sharply tapered lower portion 106 of a flange 104 rounded to a flat upper surface 108 and defining an opening 108 approximately two and one-half inches in diameter which is too small for most hands to pass through. A snap cap 110 of resilient material and any external design desired has an axially directed depending flange 112 externally enlarged enough at its lower end to interfere with the rounded flange whereby it snaps into place with a resilient engaging relationship. The tightness involved is less than that which would enable lifting the jar by the cap.

Referring to FIGS. 4 and 5, as already mentioned cut-off switches have been used before that are actuated by the removal of the liquidizer jar from the power unit. Habits have been developed of stopping the motor merely by removing the jar without touching the "stop" switch. A circuit embodying this is shown in FIG. 5 where the stop switch 110, motor 24 and a cut-off switch 112 are connected in series between two power lines $L_1$and L_2. A push rod 114 actuated by the presence of a jar closes the cut-off switch which starts the motor if the stop switch is left closed. Light pressure is generally all that is required to close the cut-off switch.

The present invention prevents dire results occurring from this habit. A starting of the motor by closing the cut-off switch is prevented unless the two-piece jar is assembled and in place with the clutch members engaged. Accordingly, the invention is adaptable for various power units because the spring 48 has to be collapsed to actuate the switch 112 no matter how lightly the switch is biased, because, as shown in FIG. 3 in broken lines, and FIG. 4 in solid lines, the push rod 114 for the switch is not actuated until the flange 66 is forced downwardly substantially its full distance.

Thus, whether a cut-off switch alone is used or none is used, the base member 94 must be in place with the jar 14 on it before the cutter assembly is driven. Therefore, one supplements the other if both are present rather than one safety control operating in a way by-passing the other.

Moreover, the clutch members which have a wide leverage radius that could cause the most damage of available clutch members in flipping or driving exposed cutters have been shown and described as representative of other drives having smaller radii wherever the drive elements are engaged by rectilineal movement and include interdigitating members that might interfere momentarily. There is no engagement unless the jar is present along with the base.

What is claimed is:

1. A liquidizer comprising:
a power unit including a housing member,
a liquidizer container including a removable base member removably supported in weight borne relationship on the housing member for vertical movement to and from the working position,
vertical drive and driven shafts journaled in said members in axial alignment with each other during said vertical movement,
axially engageable clutch elements carried by said shafts for engagement and disengagement with said movement,
means interengaging said members for urging disengagement of said elements including
reciprocable means carried by one of said members to engage the other of said members, and
resilient means carried by said one member urging said reciprocable means to move said clutch members out of engagement under the weight of the base alone.

2. The liquidizer as defined in claim 1 in which
said clutch elements have working radii greater than the distance of vertical movement required to move them from their working positions to a disengaged position.

3. The liquidizer as defined in claim 1 in which
one of said clutch elements has radially spaced extending flexible teeth intermeshing with the other clutch element.

4. The liquidizer defined in claim 1 in which the drive shaft is the armature of an electric motor, and
cut-off switch means in the electrical circuit of said motor opened by said resilient means as the clutch members are disengaged.

5. The liquidizer as defined in claim 1 in which
one of said members having a cavity facing the other member,
said resilient means including a compression spring received inwardly of the wall of the cavity, and
said reciprocable means including
a first sleeve interengaging the free end of the spring and said other member,
a second sleeve carried by said one member retaining said spring and first sleeve in engagement with each other and permitting outward movement of the first sleeve at least the vertical distance of movement necessary to disengage the clutch,
said spring being constructed and tensioned to extend said first sleeve said distance under a weight load less than that of both of the jar and base.

6. A liquidizer comprising
a power unit carrying a rotary drive clutch element at the top thereof,
a container including disengageable jar and base members, a drive shaft journaled in said base carrying rotatable cutters at the top thereof receivable in the jar,
a rotary driven clutch element at the bottom of the drive shaft axially engageable with said drive clutch element,
support means on said power unit receiving the jar and base in weight bearing relationship upon the power unit in working position,
sleeve means reciprocably mounted on said base interengaging said base and support means in weight bearing relationship,

resilient means interconnecting said base and sleeve means to urge disengagement of the clutch elements under the weight of said base alone,

the weight of said jar and base collapsing said resilient means to engage said clutch elements.

7. The liquidizer defined in claim 6 in which said support means includes angularly spaced L-shaped lugs having lower portions engageable by said base and upstanding portions engageable by said jar when said base is absent.

8. The liquidizer defined in claim 6 in which said jar is made of ceramic, the base of plastic, and the sleeves of sheet metal.

9. A liquidizer including:

a tapered vertical jar member open at both ends and of a height approximately twice the diameter of the bottom opening with the area of the upper access opening being approximately one-half that of the bottom opening,

a base member including a bottom wall and an upstanding flange encompassing the rim of said bottom opening in rotatably sealed relation, and depending container support flange defining a cavity below the bottom wall,

a cutter assembly including a shaft journaled in said bottom wall with its upper end extending above the level of said upstanding flange and a clutch member on its lower end disposed in said cavity,

a compression spring received inwardly of the wall of the cavity,

a first sleeve interengaging the free end of the spring and normally extended outwardly by said spring at the other end beyond said support flange,

a second sleeve carried by said base member retaining said spring and first sleeve in engagement with each other and permitting outward movement of the first sleeve a predetermined distance,

the spring being constructed and tensioned to extend said first sleeve said distance under a weight load less than that of both the jar and base.

10. The liquidizer defined in claim 9 in which the area of the upper access opening is too small to receive human hands therethrough of a size most users have, and

said bottom opening having an area large enough to receive hands of most users for jar cleaning purposes.

11. The liquidizer defined in claim 9 in which the diameter of the upper access opening is approximately two and one-half inches.

12. A liquidizer including:

a tapered vertical jar member open at both ends and of a height approximately twice the diameter of the bottom opening and having an upper access opening of an area approximately one-half that of the bottom opening;

a base member including a bottom wall and an upstanding flange encompassing the rim of said bottom opening in rotatably sealed relation, and a depending container support flange defining a cavity below the bottom wall;

a cutter assembly including a shaft journaled in said bottom wall with its upper end extending above the level of said upstanding flange and a member on its lower end disposed in said cavity;

a removable cover for said access opening, said access opening being too small to receive human hands therethrough of a size most users have, and

resilient means within said support flange and extendable to carry the weight of said base member when detached from said jar member.

13. The container called for in claim 12 in which said jar member has vertically extending convolutions which in cooperation with the tapered sidewall directs inwardly to the center of the container contents swirling upwardly from the cutters along the sidewall.

14. The liquidizer defined in claim 12 in which the upper access opening is defined by an inwardly directed flange having rounded edges, a substantially flat upper surface and a wall below it tapering to the upper internal wall of the jar,

the upper shape of the flange increasing the difficulty of a person's hand entering the jar and the lower shape of the flange assisting the removal of a hand if inserted in the jar.