SAFETY MECHANISM TO PREVENT
SHAFT COUPLING WHEN BLADES ARE
EXPOSED IN A BLENDER

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ABSTRACT
A safety mechanism to insure that a blender jar is properly mounted over the high speed comminuting blades of a blender to prevent exposure of the blades when they are revolving. The jar must be inserted on a base member properly and twisted to a locked position to enable the base, which has a portion of the driven blade shaft in it, to be connected to the drive shaft of the blender.

11 Claims, 13 Drawing Figures
SAFETY MECHANISM TO PREVENT SHAFT COUPLING WHEN BLADES ARE EXPOSED IN A BLENDER

BACKGROUND OF THE INVENTION

This invention relates to an improvement in domestic blenders which are generally used to comminute foods. The art of blenders has developed to the point where an electric motor, generally one-half horsepower, drives a set of blades at extremely high speeds and foods located within a jar are directly exposed to the blades which serve to macerate the food. Some manufacturers of blenders have built-in safety mechanisms to protect consumers from harm. One such mechanism is shown and described in U.S. Pat. No. 3,315,946 entitled "Mixing and Blending Device" which issued on Apr. 25, 1967. This latter safety mechanism works well, however, it requires exterior latches holding the jar to the base which detracts from the appearance of the blender. The appearance of a home appliance is very important to a housewife since it is an object which is exposed in the kitchen. The latches also require a small degree of manual dexterity which makes it difficult for some users to handle. This invention eliminates these disadvantages by dispensing with the latches entirely, thereby enhancing the appearance of the blender and a mechanism is used which requires only a twisting motion; thus, minimal manual dexterity is required.

SUMMARY

Basically, the invention comprises a base which forms the bottom of a blender jar. A driven shaft extends through the base and a plurality of blades are fixed to the shaft. The base has a plurality of openings located on the periphery thereof which are designed to receive a corresponding number of flanges on the blender jar. The base is essentially formed of two principal sections in which one part is fixed and the other is movable. The flanges on the jar extend through the openings on the fixed portion of the base and bear on a movable portion of the base. The jar must be rotated by the user in order to lock it on the base in a "bayonet lock" fashion. The movable portion of the base is actually sandwiched between two fixed portions and the movable portion has a part which is rectangular or square in configuration. The lower fixed part of the base in its normal position is out of alignment with the movable part. In this position, the base cannot be located on the drive shaft in the power module because the receiving cavity in the power module is the same shape, rectangular or square, as the movable portion of the base.

When the user rotates the jar in order to secure the flange on the jar under a lip on the fixed part of the base, the rotation is transmitted to the movable base portion which rotates and aligns with the lower fixed base part. When the movable and fixed portions of the bases are in alignment the jar and base subassembly can be placed into the cavity on the power module and the drive shaft in the module will connect with the driven shaft in the base. In this manner, the blades will always be covered when the blade drive shaft is joined to the power shaft because the jar which covers the blades must be locked on the base before the driving and driven shafts can be coupled.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

FIG. 1 is a perspective view showing the bottom of the base in the unlocked position;
FIG. 2 is a perspective view of the power module and blender jar in which the jar base is in locked position;
FIG. 3 is an exploded view of the blender jar subassembly;
FIG. 4 is a top plan view partially in section showing the base in unlocked position;
FIG. 4a is a bottom plan view showing the base in unlocked position;
FIG. 5 is a top plan view partially in section showing the base in locked position;
FIG. 5a is a bottom plan view showing the base in locked position;
FIG. 6 is a side view in section taken along the line 6--6 of FIGS. 4 and 4a;
FIG. 7 is a side view in section taken along the line 7--7 of FIGS. 5 and 5a;
FIG. 8 is a side view in section taken along the line 8--8 of FIG. 5;
FIG. 9 is a sectional view taken along the line 9--9 of FIG. 5a;
FIG. 10 is a view showing the unlocked position taken along line 10--10 of FIG. 6; and
FIG. 11 is a view showing the locked position taken along the line 11--11 of FIG. 7.

Referring to the drawings, and more particularly to FIG. 2, there is shown a power module 10 having an electric motor secured therein (not shown) which supplies the motive power to drive a drive shaft 11 which can have a square, rectangular or D-shape or any other configuration enabling it to be coupled and to drive a driven shaft. The power module 10 has an upper-standing neck 12 having a rim 13 thereon around the periphery. Spaced inwardly from the neck 12 is an upper-standing boss 14. The boss has a cavity 15 formed therein which can be any desired shape, for example square or rectangular. A protuberance 16 extends into the cavity 15 and it can be withdrawn into the boss 14 by actuating the finger piece 17 in a clockwise or counterclockwise direction as desired along the rim 13. The finger piece 17 is mechanically linked to the protuberance 16 in any known manner. A socket 18 is formed by the upward cylindrical wall 19.

A jar subassembly 20 is adapted to be removably mated to the power module 10. Referring now to FIG. 3, an exploded view of the jar subassembly is shown. The jar 21 can be any desired shape and can have a pouring spout thereon if desired. A plurality of flanges 23, in this instance three are shown, are formed on the lower periphery of the blender jar. An upper fixed base member 24 has spaced openings 25 into which the corresponding flanges fit and an interrupted lip 25a serves to secure the flanges to the base. A plurality of ledges 26 are spaced around the inner periphery of the circular base member 24 and serve as a stop for the blade subassembly 27 and as a limit stop for the flanges 23 to insure proper placement in the ring member 24. A tang 28 is secured to the base member 24 along the lower periphery and has tapped holes 29 therein. The tang 28 serves to anchor a handle 30 to the base 24. Screws (not shown) secure the handle 30 to the tang 28.
A sealing grommet 31 which can be neoprene is located between the upstanding walls 32 and 33 respectively on the blade subassembly 27. The jar 21 upon insertion into the base member 24 seats on the sealing grommet 31. A rib 31a circumferentially surrounds the bushing portion of the grommet and bears against the inside wall of the lower portion of the jar 21 when it is placed thereon. Sealing also takes place where the lower peripheral rim of the jar abuts against the flange portion 31b of the grommet 31.

Turning now to the blade subassembly 27 as depicted in FIG. 3, it will be noted that the outside wall 32 is interrupted by spaces 34. The spaces are made wide enough to permit the flange 23 on the jar 21 to enter therein whereby rotation of the jar 21 will cause a corresponding rotation of the blade subassembly 27 because the flanges 23 bear against the edge of the spaces 34. The inner wall 33 is spaced from the outer wall so as to accommodate the grommet 31 with a snug fit. The inner wall 33 forms the boundary of a dished out food receiving area 35. An elongated socket 36 (see FIG. 8) is formed in the central portion of the blade subassembly 27 and a shaft 37 extends therethrough. The shaft has an opening 38 bored therein and is shaped so as to receive a corresponding drive shaft. A set of blender blades 39 are secured to the shaft 37 by a spinner nut 40 which is more fully described in U.S. Pat. No. 3,315,946 which issued on Apr. 25, 1967 and is entitled “Mixing and Blending Device.”

A depending skirt 41 is secured to or can be integral with the blade subassembly 27. The walls forming the skirt define a generally square or rectangular open area (see FIG. 3) in which stepped cutout portions 42 and 43 are formed. The cutout portions 43 are dimensioned to receive a flange 44 which is shaped identically to the skirt 41 except that the corners have been removed so as to have a radius 45 thereon. A cylindrical portion 46 can be formed integral with the inner part of the flange 44 and has a lip 47 formed integral therewith. A fastening arm 48 is secured to or can be integral with the cylindrical portion 46 in which holes 49 are drilled therein to facilitate fastening. The arm 48 is then securely fastened to the handle 30 by screws 50 (see FIG. 4a). A hole 51 is drilled into the cylindrical bore 46 so as to receive one end 52 of a coiled spring 53. The other end 54 of the spring is formed into a loop and is secured to the movable blade subassembly 27 by a screw 55 which passes through the interior of the cylindrical bore 46. The head of the screw 55 bears lightly against the lip 47 (see FIG. 8) and extends into the underside of the dished out portion 35 so as to fix the end 54 of the spring to the blade subassembly 27.

Thus, it can be seen that the blade subassembly 27 is freely rotatable with respect to the subassembly 20 which remains stationary. Since the arm 48 is secured to the handle 30 which is secured to the subassembly 20, the flange 44 is also stationary. The spring 53 serves to rotate and normally maintain the blade subassembly 27 in the disengaged position as shown in FIGS. 1 and 4a. In this position the flange 44 extends through the cutout 43 and beyond the confines of the wall 41. The disengaged position is to be contrasted with the engaged position depicted in FIGS. 2 and 5a in which the sides of the flange 44 are in perfect alignment with the walls forming the skirt 41. In order for the user to place the jar 21 over the blade subassembly as shown in FIG. 2, the user holds the handle 30 firmly and rotates the jar 21; the blade subassembly 27 will thereby be rotated against the bias of the spring 53. The flanges 23 on the jar are thereby moved under the lip 25a on the fixed base member 24 and the pressure exerted on the flanges prevents the blade subassembly from returning to its normal disengaged position. The jar subassembly 20, as shown in the engaged position (FIG. 2) is now capable of being placed on the power module 10 because the combined skirt 41 and flange 44 form a configuration which is identical to the cavity 15, which configuration can be rectangular or square for example. When the subassembly 20 is in the disengaged FIG. 1 and 4a position, the flange 44 disrupts the continuity of the walls 41 thereby creating an interference which prevents the jar subassembly 20 from mating with the power module. Thus, the power shaft 11 can only engage with the blade shaft 37 when the jar 21 has been turned so the flanges 23 on the jar are located under the lip 25a thereby locking the jar 21 and preventing its removal from over the blades 39. The user is thereby protected from the high speed blades.

The protuberance 16 is spring-biased inwardly into the cavity 15 and when the jar subassembly 20 is inserted into the cavity 15, the protuberance extends into the opening 42 to thereby prevent the jar subassembly from being removed from the power module 10. Movement of the fingerpiece 17 will release the protuberance 16 by withdrawing it from the cavity 15.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications can be made therein without departing from the invention, and therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

1. In a blender, a protective mechanism comprising,
   a. a housing enclosing a motor and a drive shaft extending outwardly of said motor to be driven thereby,
   b. a base member which is separable from said housing,
   c. a driven shaft extending through said base member, a food comminuting means coupled to said driven shaft, and said driven shaft arranged to be coupled to and driven by said drive shaft,
   d. means on said base member for receiving and retaining thereon a removable jar which completely covers said comminuting means,
   e. an interference means on said base member which in normal position precludes attachment of said drive shaft to said driven shaft and permits coupling of said drive shaft and said driven shaft only when said jar is properly placed and locked on said base member so as to cover said comminuting means,
   f. said interference means on said base member comprises a fixed member and a movable member movable relative to said fixed member so that in the normal position said movable member is out of alignment with said fixed member and said movable member can be moved selectively from the normal position relative to said fixed member into alignment with said fixed member so that coupling of said drive shaft and said driven shaft can be attained.

2. In a blender as defined in claim 1 in which said housing has a releasable latching means thereon to selectively secure and release the base and jar thereon
when said jar is properly placed and locked on said base.

3. In a blender as defined in claim 1 in which the housing is formed with a socket therein, and the drive shaft extends into said socket.

4. In a blender as defined in claim 3 in which the base member is shaped and sized to correspond with and to fit into said socket on the housing.

5. In a blender as defined in claim 1 in which a spring has one end secured to said fixed member and the other end secured to said movable member to bias said movable member into the normal position.

6. In a blender as defined in claim 1 in which the base member comprises walls forming a depending skirt having cutout portions therein and the fixed member includes interference members which extend beyond the walls forming the depending skirt and interrupt the contour of the skirt walls the in normal position, and the interference members align with the walls forming the depending skirt when the jar is properly placed and locked on the base member.

7. In a blender as defined in claim 1 in which the jar has at least one flange thereon which is securely held by a lip on said base member.

8. In a blender as defined in claim 7 in which the base member includes a portion having at least one notch therein, in which at least one flange on said jar extends therein, whereupon rotational movement of said jar causes the flange on the jar to exert pressure against the edge forming the notch to thereby correspondingly rotate the base member.

9. In a blender as defined in claim 7 further comprising a ring member having at least one notch therein spaced axially above the notch in the base member and at least one lip extending inwardly of said ring adjacent said notch which overlies the flange on the jar upon rotation of said jar and locks the jar on said base member.

10. In a blender as defined in claim 9 further comprising a handle secured to said ring member.

11. In a blender as defined in claim 1 in which said interference means includes a resilient member located within said base member for biasing said movable member into the normal position.