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(54) **PROCESSING TOOL ATTACHMENTS FOR A FOOD MIXING DEVICE**

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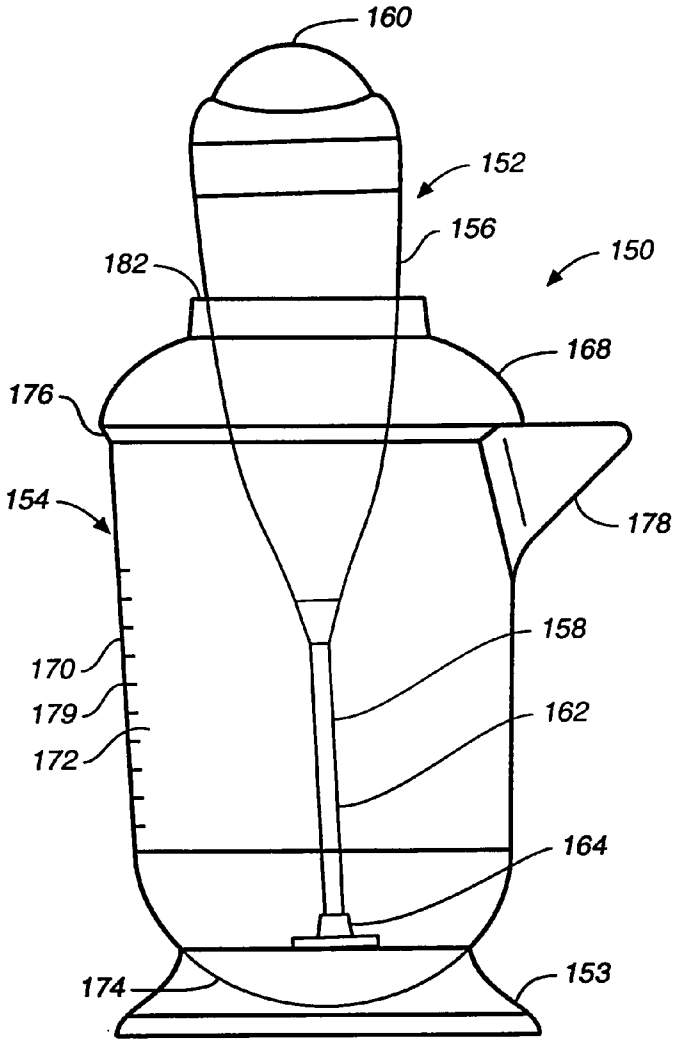
Publication Classification

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(57) **ABSTRACT**

The present invention generally discloses processing tools for attachment to a hand-held blender. The processing tools are uniquely designed for realizing a perfect consistency for specialty foodstuffs. Also, the invention sets forth an easy attachment mechanism for securing a removable processing tool to a hand held blender. Furthermore, a container for use with a hand-held blender is also provided.



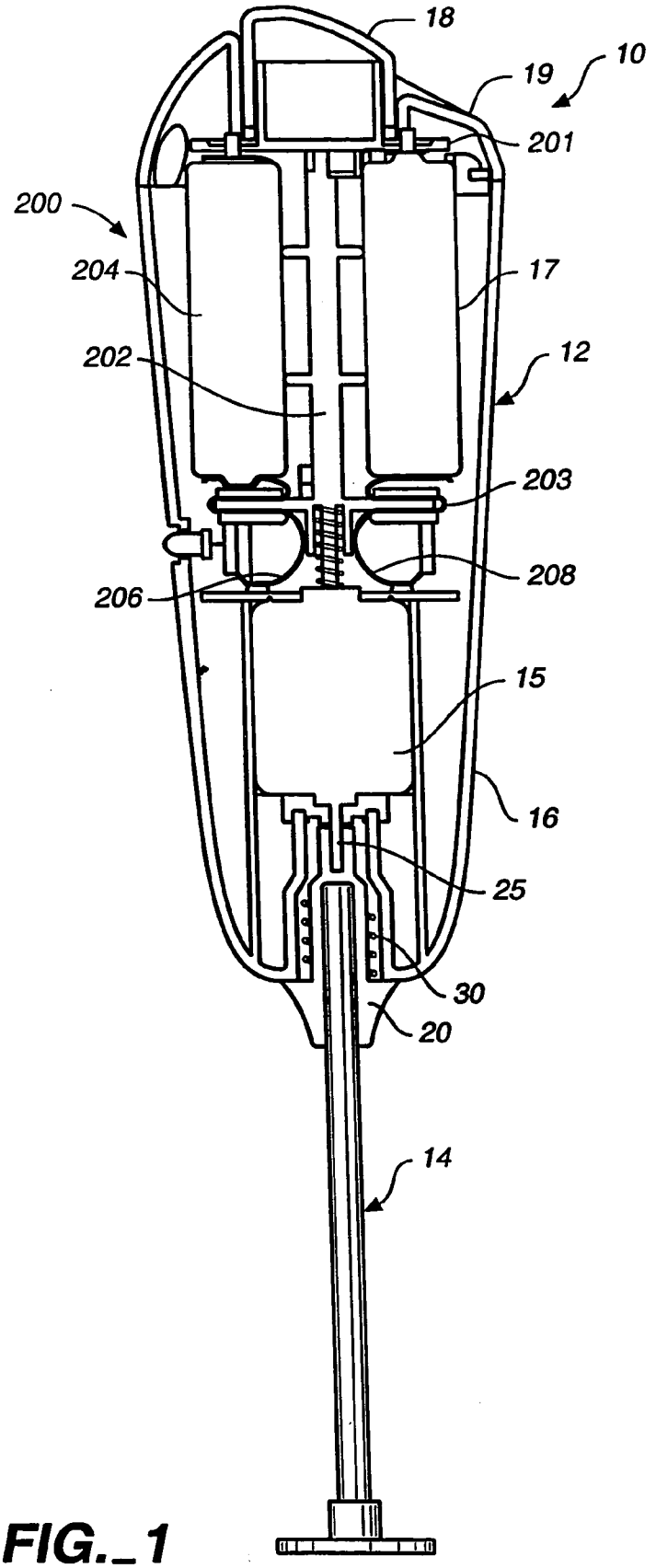


FIG._1

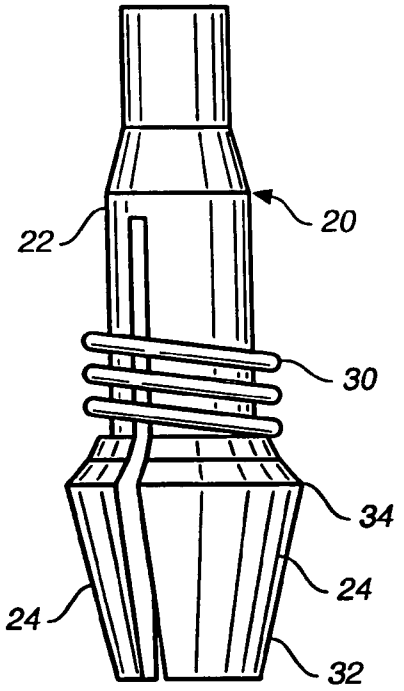


FIG._2

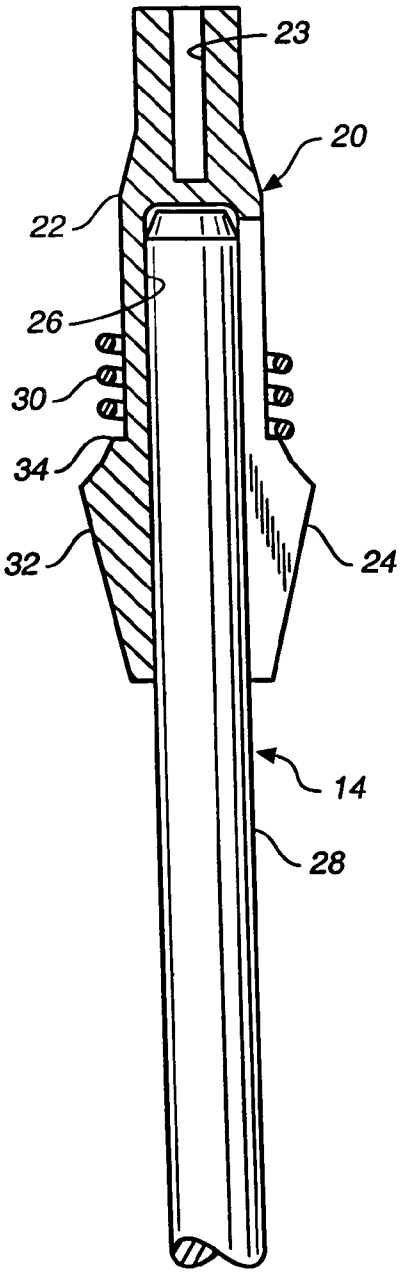


FIG._4

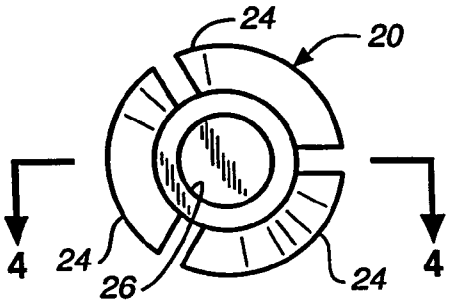


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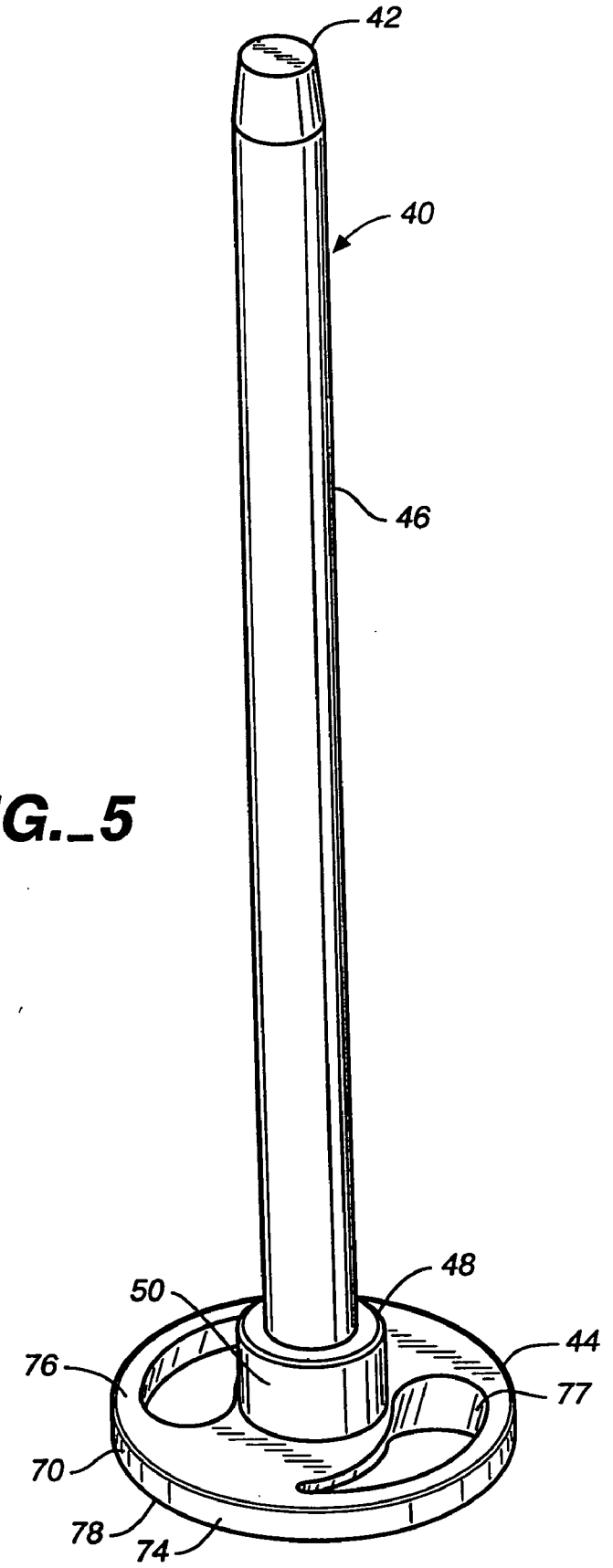


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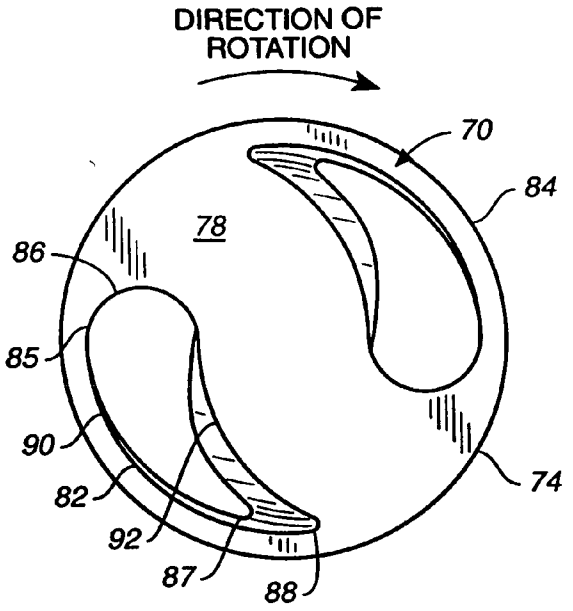


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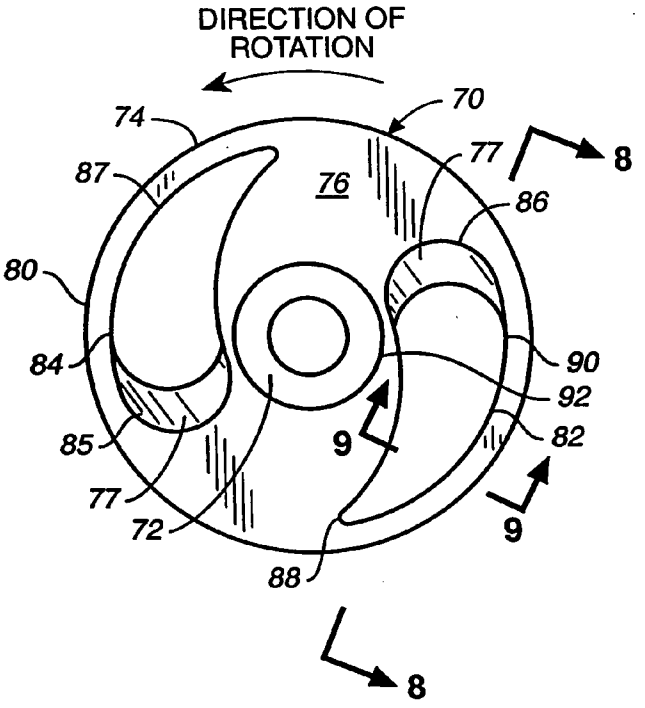


FIG._7

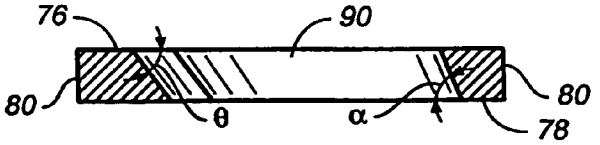


FIG._8

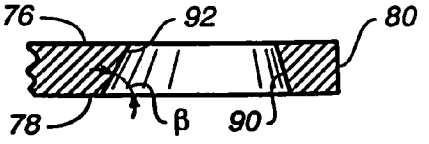


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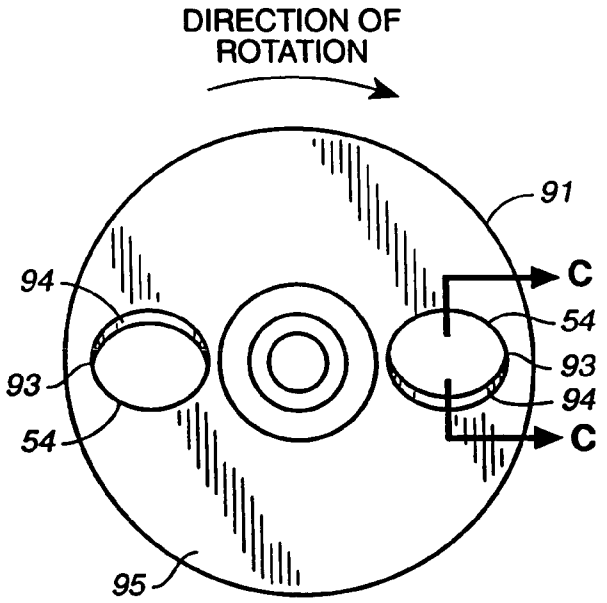


FIG._10A

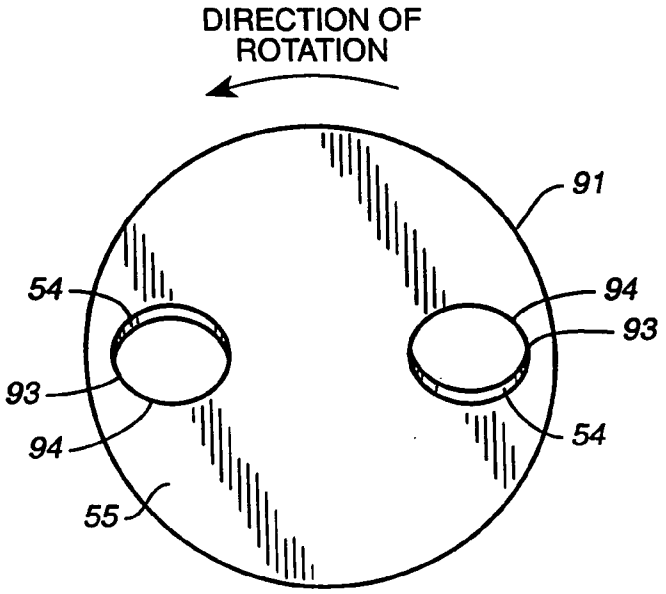


FIG._10B

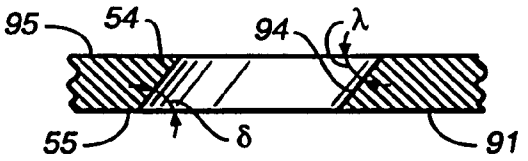


FIG._10C

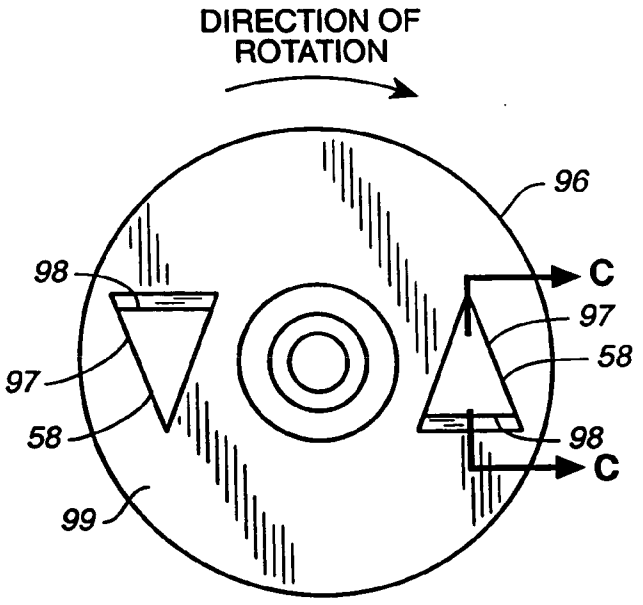


FIG._11A

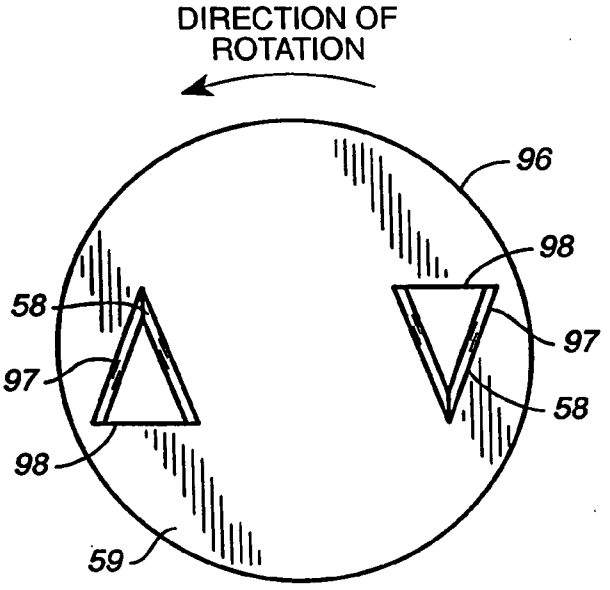


FIG._11B

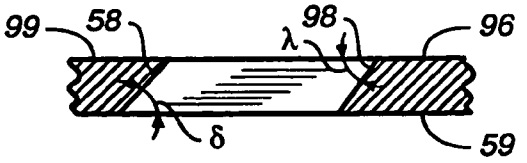


FIG._11C

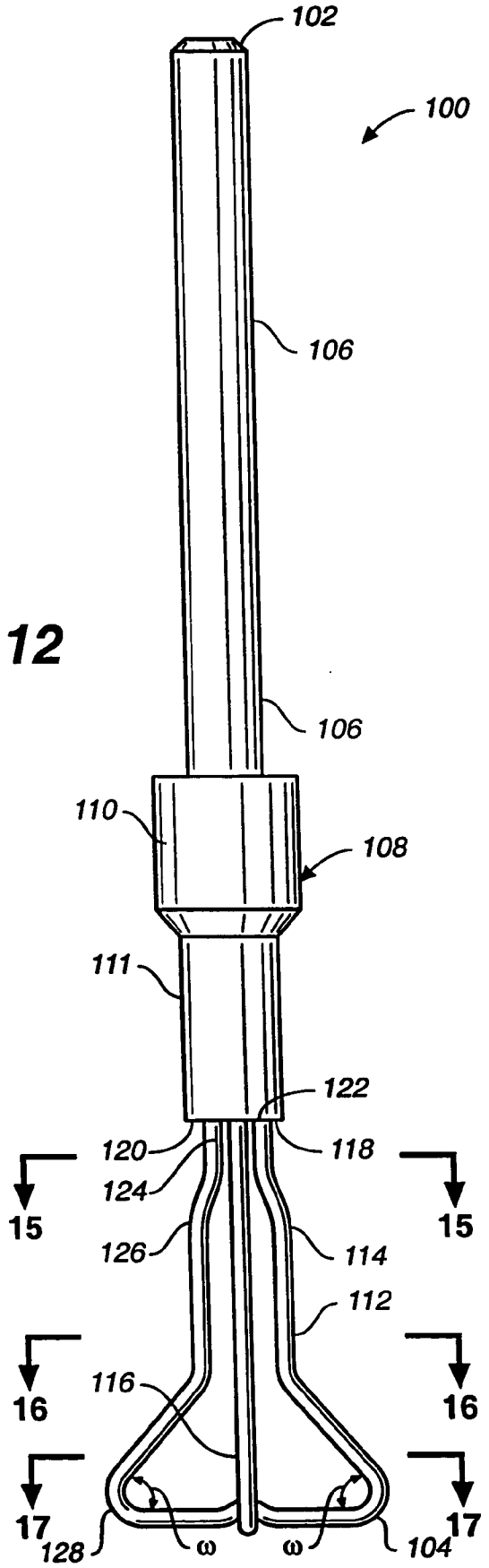

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FIG._12

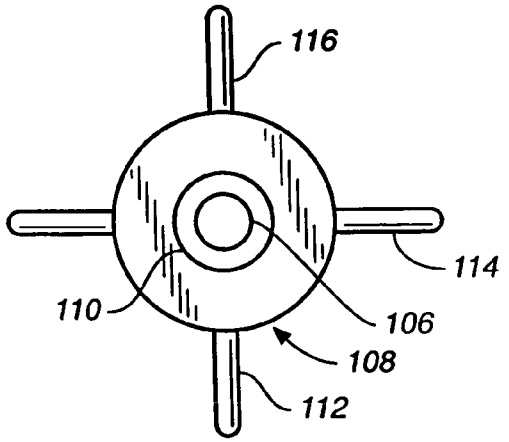


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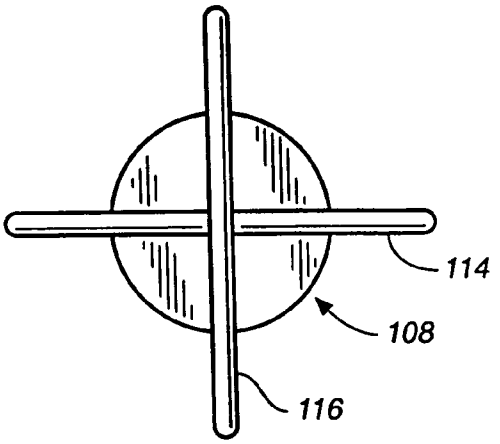


FIG._14

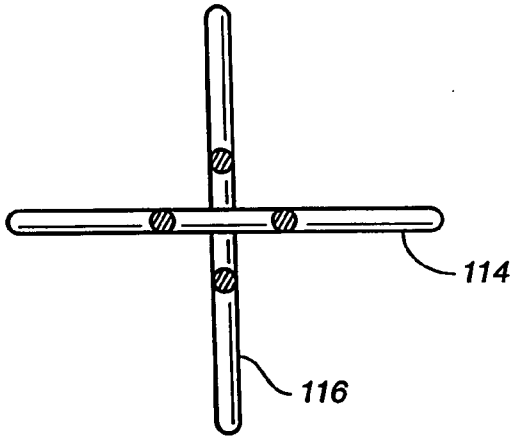


FIG._15

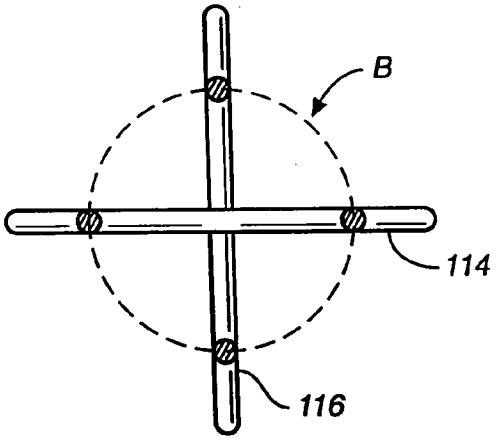


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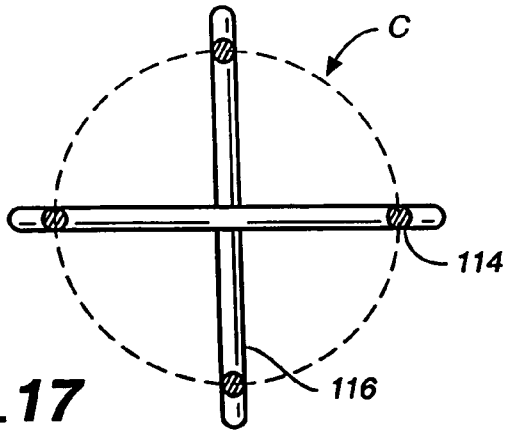


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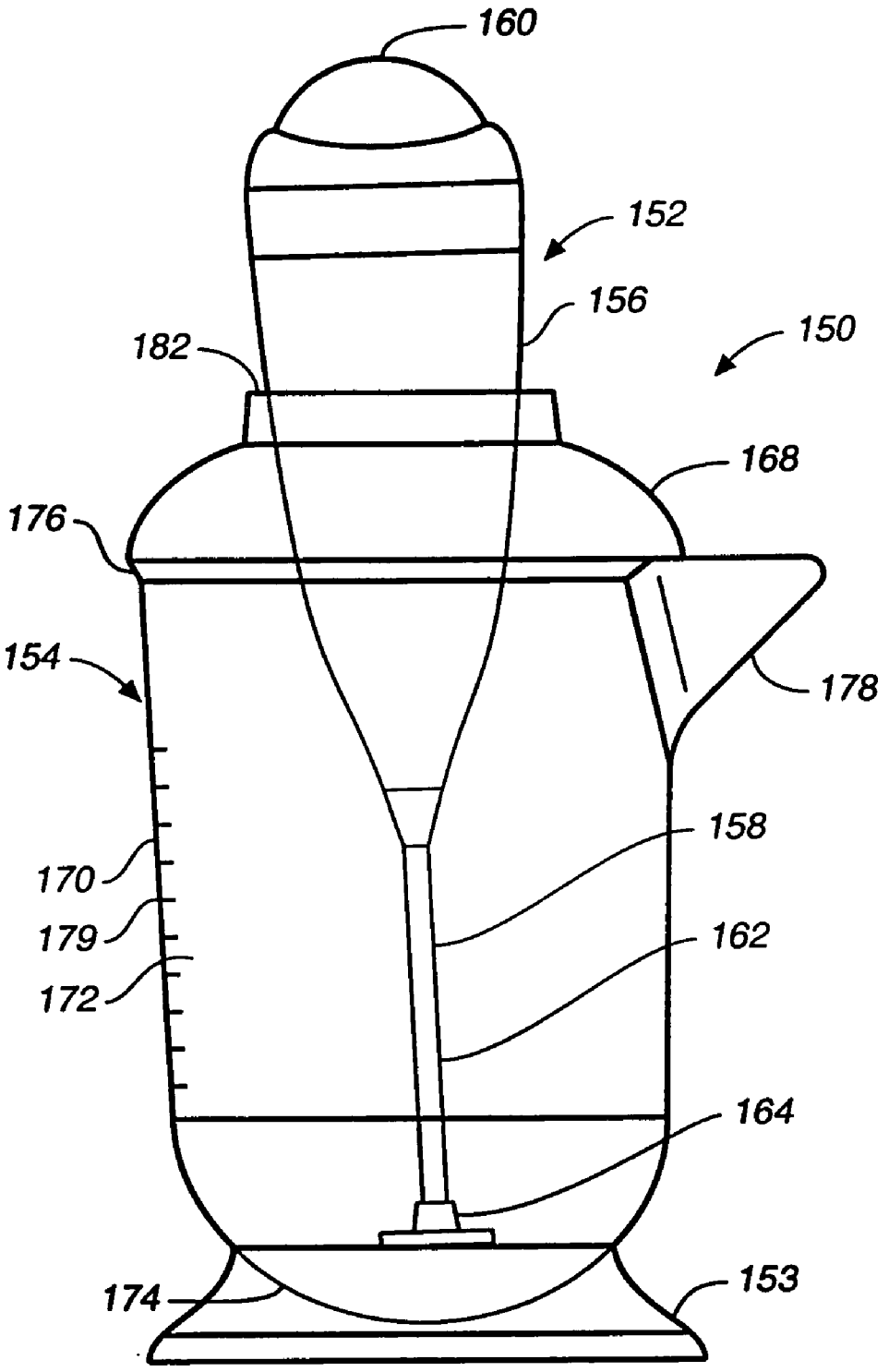

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FIG._18

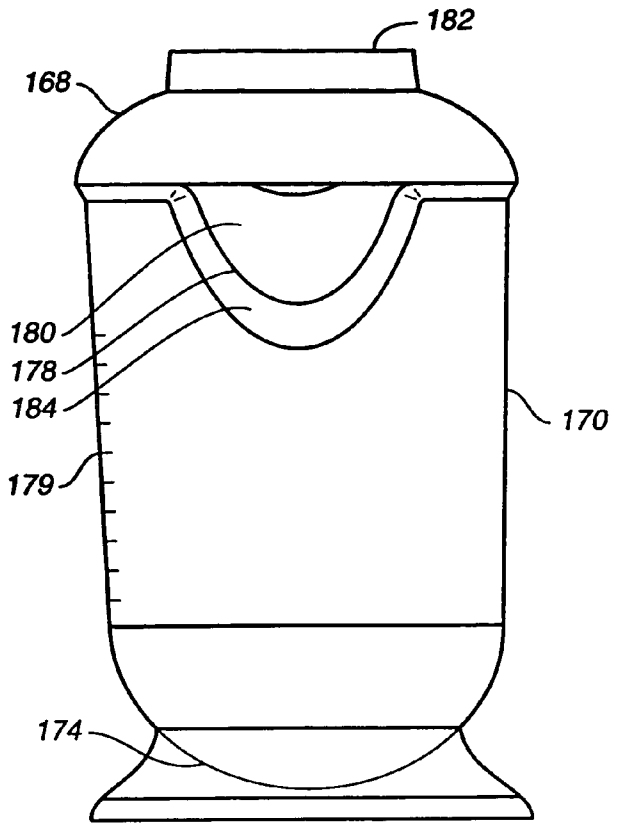


FIG._19

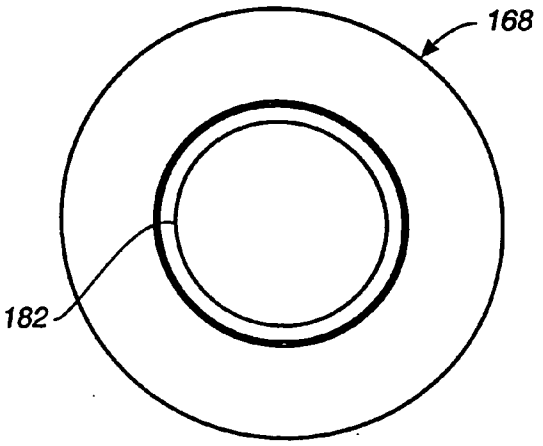


FIG._20

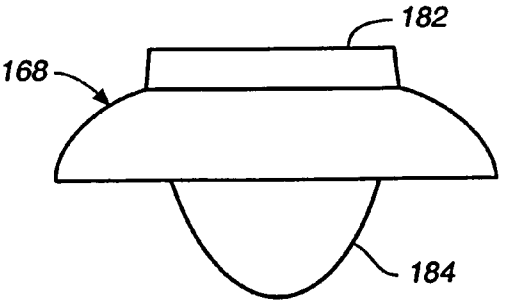


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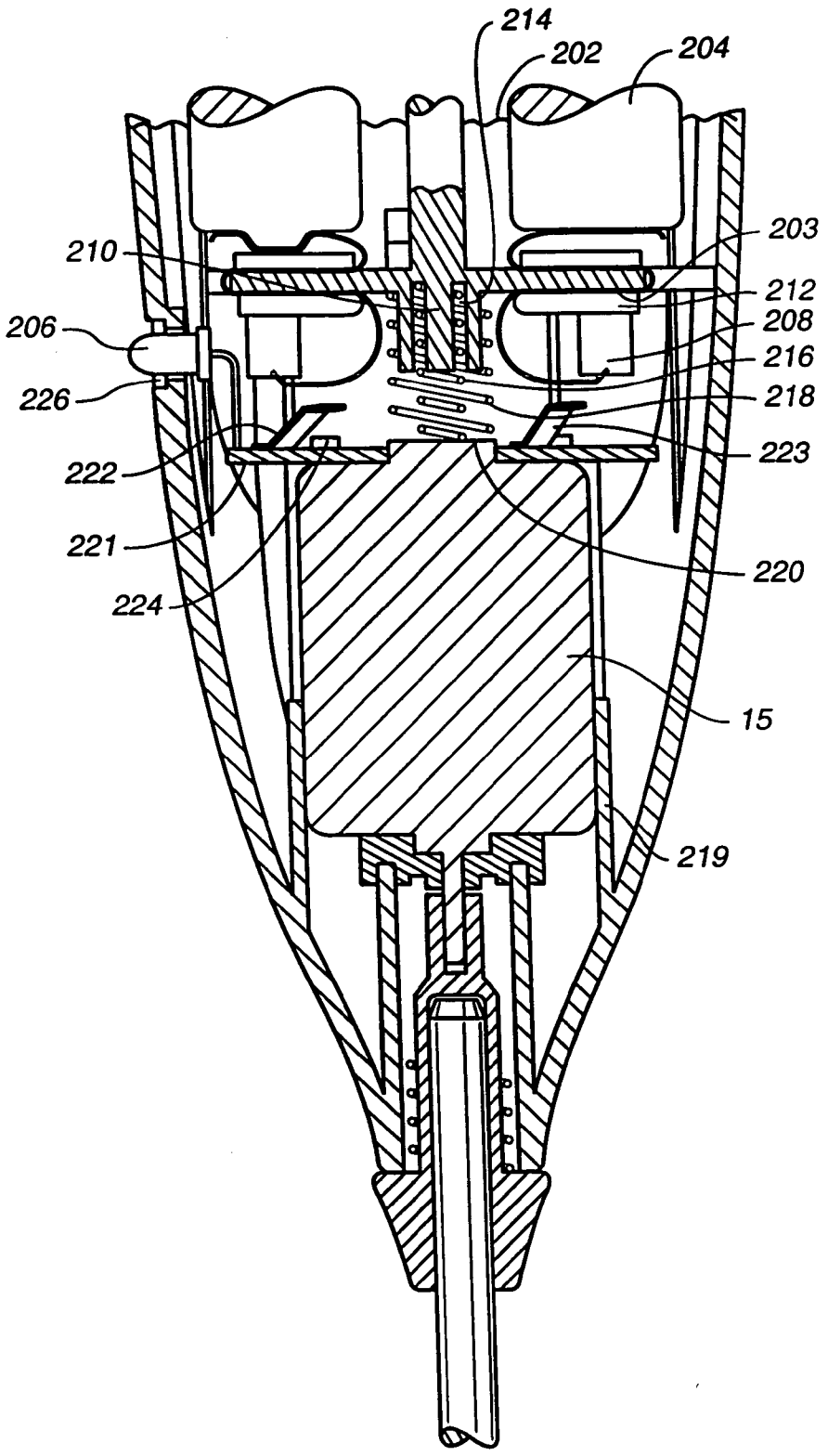

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FIG._22

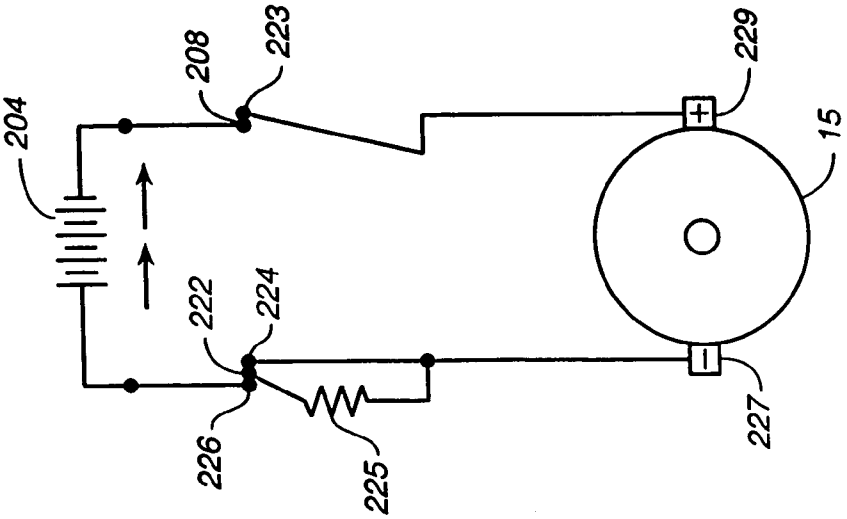


FIG._23C

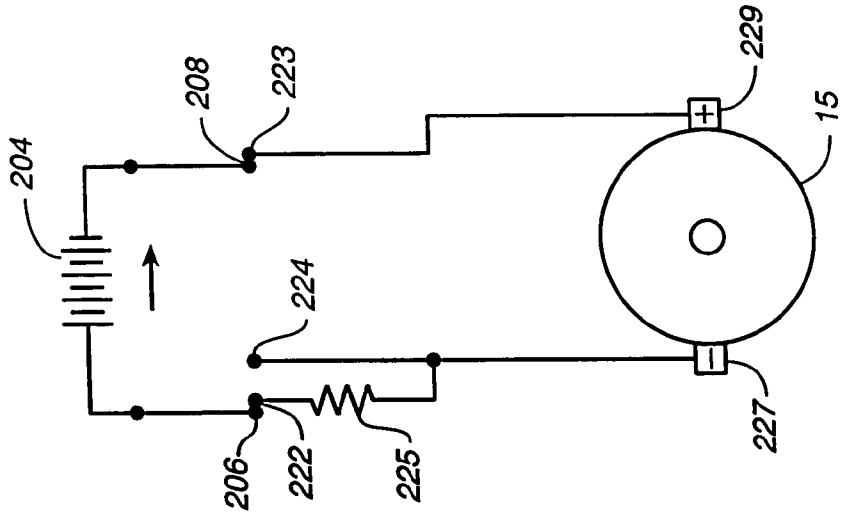


FIG._23B

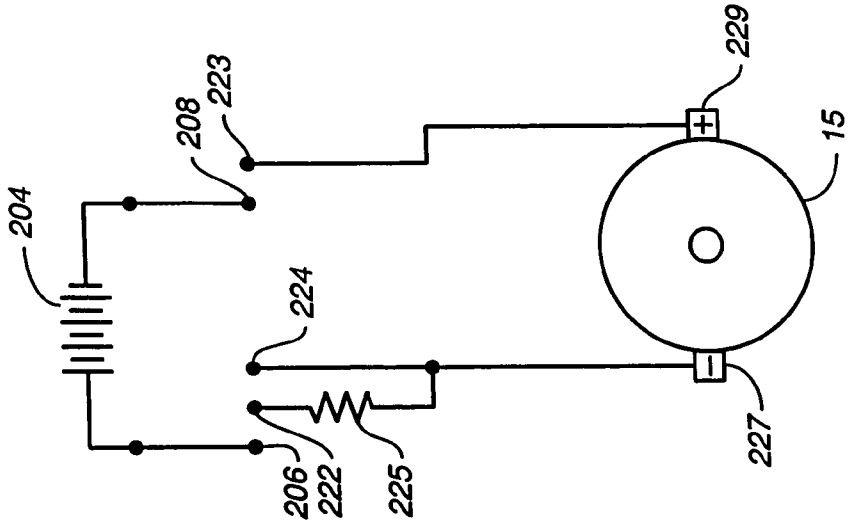


FIG._23A

PROCESSING TOOL ATTACHMENTS FOR A FOOD MIXING DEVICE

FIELD OF INVENTION

[0001] This invention relates generally to mixing devices, and more particularly to processing tool attachments for a hand-held blender for mixing foodstuffs and to a container for use with a hand-held blender.

BACKGROUND

[0002] Hand-held blenders are popular kitchen appliances for use with various foodstuffs. They provide an easy and convenient way of folding, stirring, mixing, combining, blending, whipping, emulsifying, homogenizing and beating various substances. Relatively small hand-held blenders do not consume valuable counter space and are conveniently employed on crowded kitchen counters. Battery operated hand-held blenders that do not require proximity to electric sockets and do not have interfering electric cords further facilitate the preparation of foods whether it be at home, office, or restaurant. In addition to making cooking more enjoyable, the ability to pull out a hand held blender to mix some protein powder into a beverage, for example, or to foam milk into a fluffy yet firm foam for a perfect cup of cappuccino, makes it possible to enjoy favorites more often.

[0003] A typical hand-held blender includes an elongated, tubular housing shaped to comfortably fit in a person's hand. The blender includes a processing tool having a working shaft. The working shaft is connected to and rotatably driven by an electric motor located within the housing that is activated by the push of a actuator on the housing. Some blenders have multiple buttons that correspond with different rotational speeds of the motor. Sometimes the perfect consistency for a particular beverage begs for a particular processing tool. Processing tools that are detachable from the housing allow the user to interchange processing tools for the specialized processing of foodstuffs. A particular processing tool is sometimes more suitable for a particular food processing function and the required consistency. Particular processing tools having unique designs help realize the perfect processing function and the required consistency for a variety of recipes.

[0004] Also, a removable processing tool is desirably attached to the driving motor in a manner such that the tool does not separate from the motor when the two are coupled either at high rotational speed, or after prolonged rotation. Typically, the shaft of the processing tool is inserted into a chuck that is firmly attached to the motor shaft. It is desirable that such a tool be insertable and removable quickly and easily without undue worry about its proper securement. An attachment mechanism securely attaches a removable and interchangeable processing tool to the housing portion of a hand-held blender.

SUMMARY OF INVENTION

[0005] In accordance with one aspect of the invention, there is provided a blender comprising a processing tool having a shaft and a body. The body includes a motor and a collet configured to couple the processing tool to the motor. The collet is connected to the motor at a first end. The collet includes a collet body and at least two extensions forming a shaft-receiving portion at a second end. The shaft of the processing tool is received within the shaft-receiving portion forming a friction-fit engagement to secure the processing tool.

[0006] In accordance with another aspect of the invention, there is provided a processing tool comprising a shaft configured to couple to a blender at a first end and a body connected to the shaft at a second end. The body includes a working portion. The working portion has a top surface and a bottom surface interconnected by a sidewall. The working portion includes at least a first opening extending between the top surface and the bottom surface. The first opening includes a leading end interconnected to a trailing end. At least a portion of the trailing end forms an angle with the bottom surface that is less than 90 degrees.

[0007] In accordance with another aspect of the invention, there is provided a processing tool for a blender comprising a shaft configured to couple to a blender at a first end and a body connected to the shaft at a second end. The body includes a working portion. The working portion includes a wire frame having an upper portion and a lower portion. The upper portion is closer to the first end than the second portion. The wire frame defines a cross-sectional area at the upper portion that is smaller than the cross-sectional area defined by the wire frame at the lower portion.

[0008] In accordance with another aspect of the invention, there is provided a container for use with a hand-held blender that has a processing tool attached thereto. The container includes a sidewall interconnected to a base. The sidewall and base define an interior and an opening. A lid is adapted to be received in the opening. The lid includes a blender opening configured to insert the hand-held blender therethrough and into the container interior. The container is adapted to rest the blender against the lid at the blender opening such that the processing tool of the blender is spaced from the base.

[0009] In accordance with another aspect of the invention there is provided a blender comprising a processing tool, a housing and a motor located within the housing. The processing tool is coupled to the motor to be rotatably driven by the motor. The motor includes a first motor terminal and a second motor terminal. The blender also includes a battery cartridge located within the housing. The battery cartridge is adapted to receive at least one battery. The battery cartridge has a first end and a second end. The battery cartridge includes a first cartridge terminal and a second cartridge terminal at the second end. An actuator coupled to the first end of the battery cartridge. The blender further includes a circuit board located between the motor and the battery cartridge. The circuit board is adapted to electrically connect to the at least one battery to power the motor. The circuit board includes a resilient first contact, a resilient second contact, a third contact, and at least one resistor. The resilient first contact is electrically connected to the first motor terminal through the resistor. The resilient second contact is electrically connected to the second motor terminal. The third contact is electrically connected to the first motor terminal. The resilient first contact is located above the third contact. The blender further includes a first spring attached to the battery cartridge. The first spring extends from the second end of the battery cartridge. The battery cartridge is spaced from the circuit board by the first spring such that the blender is not activated. Depressing the actuator compresses

the first spring to a first position in which the first cartridge terminal and the second cartridge terminal are in contact with the resilient first contact and resilient second contact, respectively, to activate the motor to rotate the processing tool at a first speed. Depressing the actuator further compresses the first spring further to a second position in which the first resilient contact is flexed to contact the third contact to activate the motor to rotate the processing tool at a second speed. The second speed is greater than the first speed due to the resistor being shunted out of the circuit when the resilient first contact contacts the third contact.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

[0011] **FIG. 1** is a cross-section view of an example blender;

[0012] **FIG. 2** is a side elevation view of an example collet;

[0013] **FIG. 3** is a bottom plan view collet of the **FIG. 2**;

[0014] **FIG. 4** is a side cross-section view of the collet and shaft;

[0015] **FIG. 5** is a perspective view of an example processing tool;

[0016] **FIG. 6** is a bottom plan view of the processing tool of **FIG. 5**;

[0017] **FIG. 7** is a top plan view of the processing tool of **FIG. 5**;

[0018] **FIG. 8** is a cross-section view taken along line **8-8** of **FIG. 7** of the processing tool of **FIG. 5**;

[0019] **FIG. 9** is a cross-section view taken along line **9-9** of **FIG. 7** of the processing tool;

[0020] **FIG. 10A** is a top plan view of a second example of a processing tool;

[0021] **FIG. 10B** is a bottom plan view of the processing tool of **FIG. 10A**;

[0022] **FIG. 10C** is a partial cross-section view taken along line C-C of **FIG. 10A** of the processing tool of **FIG. 10A**;

[0023] **FIG. 11A** is a top plan view of a third example of a processing tool;

[0024] **FIG. 11B** is a bottom plan view of the processing tool of **FIG. 11A**;

[0025] **FIG. 11C** is a partial cross-section view taken along line C-C of **FIG. 11A** of the processing tool of **FIG. 11A**;

[0026] **FIG. 12** is a side elevation view of a fourth example of a processing tool;

[0027] **FIG. 13** is a top plan view of the processing tool of **FIG. 12**;

[0028] **FIG. 14** is a bottom plan view of the processing tool of **FIG. 12**;

[0029] **FIG. 15** is a cross-section view of the fourth example processing tool taken along line **15-15** of **FIG. 12** of the processing tool;

[0030] **FIG. 16** is a cross-section view of the fourth example processing tool taken along line **16-16** of **FIG. 12** of the processing tool;

[0031] **FIG. 17** is a cross-section view of the fourth example processing tool taken along line **17-17** of **FIG. 12** of the processing tool;

[0032] **FIG. 18** is a side elevation view of an example blender and processing bowl system;

[0033] **FIG. 19** is a side elevation view of the processing bowl of the **FIG. 18** system;

[0034] **FIG. 20** is a top plan view of the lid of the processing bowl of the **FIG. 18** system;

[0035] **FIG. 21** is a side elevation view of the lid of the processing bowl of the **FIG. 18** system;

[0036] **FIG. 22** is a partial cross-section view of a portion of the blender of the **FIG. 18** system;

[0037] **FIG. 23A** is an equivalent circuit diagram illustrating an off configuration of an example two-speed activation mechanism;

[0038] **FIG. 23B** is an equivalent circuit diagram illustrating a low-speed configuration of the example two-speed activation mechanism; and

[0039] **FIG. 23C** is an equivalent circuit diagram illustrating a high-speed configuration of the example two-speed activation mechanism.

DETAILED DESCRIPTION

[0040] Referring now to **FIG. 1**, there is shown a hand-held blender **10**. The blender **10** includes a body **12** coupled to a processing tool **14**. The body **12** includes an elongated, tubular housing **16** shaped to comfortably fit in a person's hand. A motor **15** is located within the housing **16**. The motor **15** is powered by batteries **17** also located within the housing **16**. Alternatively, the motor is powered by an alternating current via an electric cord. The motor **15** is manually actuated by a button or actuator **18** conveniently located at the top of the housing **16** that sets the motor **15** into operation at one of at least one speed.

[0041] The blender according to the invention further includes a collet **20**. The collet **20** is adapted to receive one end of the processing tool **14**. The collet **20** couples the processing tool **14** to the motor **15** that rotatably drives the collet **20** and processing tool **14**. The collet **20** is shown in FIGS. **2-4** and will now be described. **42** With particular reference to FIGS. **1-4**, the collet **20** includes a body **22** at least two fingers or extensions **24** and a spring **30**. The variation shown here includes three extensions **24**. The body **22** of the collet **20** includes a bore **23** configured to receive a drive shaft **25** of the motor **15**. The fingers or extensions **24** extend from the body **22** to form a shaft-receiving portion **26** that is adapted to grip a shaft **28** of a processing tool **14**. The inner surface of each finger **24** is shaped to substantially conform to the outer surface of the shaft **28** such that the three fingers **24** in conjunction with one another substan-

tially encompass the shaft **28**. Each of the fingers **24** has an end portion **32**. The end portion **32** is tapered and includes a shoulder **34**.

[**0042**] The collet **20** firmly secures the processing tool **14** and transfers to the processing tool **14** the rotational torque generated by the motor shaft **25** which is firmly located in the bore **23** of the collet **20**. The three fingers **24** of the collet **20** are stressed in an inwardly radial direction by the spring **30**. The spring **30** is made of a metal wire wound in a helical fashion. The relaxed diameter of the spring **30** is smaller than the outer diameter of the collet **20** on which the spring **30** is seated. When the spring **30** is forcefully pushed into its place on the collet **20**, the three collet fingers **24** are forced to move inwardly in a radial direction. When the shaft **28** of the processing tool **14** is inserted into the collet **20**, the shaft **28** pushes the fingers **24** outwardly against the force of the spring **30**. The expanded spring **30** applies a radial force on the fingers **24** which in turn transfer that force to the shaft **28** thereby creating a friction fit engagement that maintains the shaft **28** in alignment with the collet **20** and the motor shaft **25**. Additionally, the friction fit generates sufficient frictional force to transfer the motor torque to the processing tool **14**.

[**0043**] Referring now to FIGS. **5-9**, there is depicted a processing tool **40** having a first end **42** and a second end **44**. The processing tool **40** includes a shaft **46** and a body **48**. The body **48** is attached to the shaft **46** at the second end **44**. The first end **42** is adapted for engagement with a collet **20** of the type described above, although the invention is not so limited. The body **48** includes a shaft-receiving portion **50** integrally formed with a working portion **70**. The working portion **70** is approximately 0.080 inches to 0.150 inches in thickness and includes a top surface **76** and a bottom surface **78** interconnected by a sidewall **74**. The top surface **76** is substantially parallel to the bottom surface **78**. The working portion **70** is substantially circular in shape and has a diameter of approximately 0.750 inches to approximately 1.250 inches. The shaft **46** is attached to the body **48** by being received in the shaft-receiving portion **50** and affixed therein with, for example, an adhesive, a friction fit, or by insert molding. The body **48** is preferably made from a plastic material such as Polyamid.

[**0044**] As can be seen in FIGS. **5-9**, the working portion **70** is a substantially circular disc having a pair of openings—a first opening **82** and a second opening **84**. Both openings **82** and **84** are located substantially opposite from each other. Since the openings **82** and **84** are substantially identical, only one will be described in detail. Although the working portion **70** is depicted with two openings, the invention is not so limited and any number of openings is possible such that at least one opening is employed.

[**0045**] The processing tool **40** is adapted to rotate in the direction shown by the arrow in **FIGS. 6 and 7** when activated. Still referencing FIGS. **5-9**, each opening includes a leading end **85** and a trailing end **87** with respect to the direction of rotation. At least a portion of the leading end **85** is sloped to form an angle with respect to the top surface **76** that is less than 90 degrees. At least a portion of the trailing end **87** is sloped to form an angle with respect to the bottom surface **78** that is less than 90 degrees. The portion of the trailing end **87** that is sloped to be less than 90 degrees with respect to the bottom surface forms a vane portion or impeller that directs foodstuffs and air adjacent to the top surface **76** to the other side and adjacent the bottom surface **78** when the processing tool **40** is activated to rotate. Similarly, the portion of the leading end **85** that is angled less than 90 degrees with respect to the top surface **76** aids in directing foodstuffs and air downwardly from adjacent the top surface **76** to adjacent the bottom surface **78**. This impeller action of the processing tool **40** is accomplished by a various types openings having different shapes and sizes as will be made clear hereinbelow.

[**0046**] In the variation shown in FIGS. **5-9**, the opening **82** includes a first end **86** and a second end **88** interconnected by an outer side **90** and an inner side **92**. The first end **86** is curved and extends between the top surface **76** and the bottom surface **78** at an angle θ with respect to the top surface **76**. The angle θ is defined between the top surface **76** and the surface **77** that is interior to the opening **82**. As can be seen in **FIG. 8**, the angle θ that the first end **86** forms with respect to the top surface **76** is less than 90 degrees, and preferably approximately from 30 and 60 degrees. In one variation, the angle θ is not constant along the entire first end **86** but varies from approximately 30 and 90 degrees. The first end **86** serves as the leading end **85** in the rotation.

[**0047**] The outer side **90** of opening **82** is curved. When viewed from the top surface **76** or the bottom surface **78**, the outer side **90** is substantially parallel with respect to the sidewall **74** as shown in **FIGS. 6 and 7**. In one variation, the outer side **90** extends between the top surface **76** and the bottom surface **78** such that the outer side **90** is substantially perpendicular with respect to either the top surface **76** or bottom surface **78**. In another variation, the outer side **90** extends between the top surface **76** and the bottom surface **78** at an angle α with respect to the bottom surface **78** as shown in **FIG. 8**. The angle α is defined between the bottom surface **78** and the surface that opens to the interior of the opening. In one variation, angle α is less than 90 degrees, and preferably approximately from 80 degrees and 85 degrees. In one variation, the angle α is not constant along the entire length of the outer side **90** but varies from approximately 80 degrees and 90 degrees along the length of the outer side **90** such that the angle α is approximately 90 degrees at the first end **86** and transitions to approximately 80 degrees at the second end **88**.

[**0048**] The inner side **92** of opening **82** is curved. In one variation, the inner side **92** extends between the top surface **76** and the bottom surface **78** such that the inner side **90** is substantially perpendicular with respect to either the top surface **76** or bottom surface **78**. In another variation, the inner side **92** extends between the top surface **76** and the bottom surface **78** at an angle β with respect to the bottom surface **78** as shown in **FIG. 9**. In one variation, angle β is less than 90 degrees, and preferably approximately from 60 degrees and 90 degrees. In one variation, the angle β is not constant along the entire length of the inner side **92** but varies from approximately 60 degrees and 90 degrees such that the angle β is approximately 90 degrees at the first end **86** and transitions to approximately 60 degrees at the second end **88**. Generally, the opening **82** is wider at the first end **86** and narrows towards the second end **88**. Together the outer side **90** and inner side **92** include at least a portion that is angled less than 90 degrees with respect to the bottom surface **78**. In this variation both the outer side **90** and the

inner side **92** form the trailing end **87** that acts as a V-shaped vane that opens to at the bottom surface **78** as can be seen in **FIG. 6**.

[**0049**] With respect to FIGS. **5-9**, the shape of the openings **82**, **84** may be generally described as being a curved tear-drop or a paisley shape. Together, the pair of openings **82**, **84** form a design commonly known as the "yin-yang" symbol to invoke the feeling of harmony. When the processing tool is attached to the motor and the processing tool is immersed into liquid, the motor is engaged and the shaft rotates. The processing tool is adapted for rotation such that the first end of each of the openings leads in the rotation and the first end of the first opening trails the second end of the second opening. This direction of rotation is illustrated by the directional arrow in **FIGS. 6 and 7**. When the processing tool rotates, the working portion **70** creates a vortex such that when the vortex is completely established, at least a portion of the top surface **76** is contact with air. The first end **86** is shaped so that it acts like a vane, scooping air at the top surface **76** and discharging it on the bottom surface **78**, thereby mixing the air with the liquid. Therefore, the working portion **70** serves as an impeller. This type of design for the working portion **70** is particularly effective for frothing or foaming chilled milk, creating a froth or foam that is firm and fluffy and commonly suitable for various coffee-type beverages.

[**0050**] Although, the openings **82**, **84** of the working portion **70** are illustrated to have tear-drop or paisley shapes, other examples have other shapes. The impeller action of the working portion **70** can be accomplished by openings having a variety of shapes as mentioned above. For example, referring now to **FIGS. 10A, 10B** and **10**C, there is depicted one variation of a working portion **91** having openings **93** that are substantially circular in shape. Each opening **93** includes a leading end **94** and a trailing end **54**. At least a portion of the leading end **94** is at an angle λ that is less than 90 degrees with respect to the top surface **95** and preferably approximately between 30 and 60 degrees as shown in **FIG. 10C**. In one variation, the angle is not constant along the entire length of the leading end **94** but varies to create a smooth transition. The working portion **91** rotates in the direction shown by the arrow in **FIG. 10A** such that the leading end **94** is the leading edge in the rotation. Referring to **FIG. 10**B, there is shown a bottom plan view of the working portion **91**. At least a portion of the trailing end **54** is at an angle δ that is less than 90 degrees with respect to the bottom surface **55** as shown in **FIG. 10C**. When rotating, the working portion **91** acts as an impeller that directs foodstuffs and air adjacent to the top surface **95** downwardly through the openings **93** to thoroughly mix the foodstuffs and to thrust air into the mixture.

[**0051**] Referring now to **FIGS. 11A, 11B**, and **11**C, there is shown another example of a working portion **96** having openings **97** that are substantially triangular in shape. Each opening **97** includes a leading end **98** and a trailing end **58**. At least a portion of the leading end **98** is at an angle λ that is less than 90 degrees with respect to the top surface **99** and preferably approximately between 30 and 60 degrees. In one variation, the angle is not constant along the entire length of the leading end **98** but varies to create a smooth transition. The working portion **91** rotates in the direction shown by the arrow in **FIG. 11A** such that the leading end **98** leads in the rotation. Referring to **FIG. 11**B, there is shown a bottom plan view of the working portion **96**. As shown in **FIGS. 11B and 11C**, at least a portion of the trailing end **58** is at an angle δ that is less than 90 degrees with respect to the bottom surface **59**. When rotating, the working portion **96** acts as an impeller that directs foodstuffs and air adjacent to the top surface **99** downwardly through the openings **97** to thoroughly mix the foodstuffs and to thrust air into the mixture. Therefore, as illustrated, the openings having a variety of shapes are within the scope of the invention such that at least a portion of the leading end is angled less than 90 degrees with respect to the top surface and at least a portion of the trailing end is angled less than 90 degrees with respect to the bottom surface. In yet another variation, the opening includes only an angled trailing end.

[**0052**] Referring now to FIGS. **12-17**, there is depicted a processing tool **100** having a first end **102** and a second end **104**. The processing tool **100** includes a shaft **106** and a body **108**. The body **108** is attached to the shaft **106** at the second end **104**. The first end **102** of the processing tool **100** is adapted to engage with a collet of the type described above, although the invention is not so limited. The body **108** includes a shaft-receiving portion **110** integral with a wire-receiving portion **111**. The shaft **106** is attached to the body **108** by being received in the shaft-receiving portion **110** and affixed therein with, for example, an adhesive, friction fit, or by insert molding. The body **108** is preferably made from a plastic material such as Polyamid. The working portion **112** is preferably made from a stainless steel wire and is secured in the wire-receiving portion **111**. The wire-receiving portion **111** includes, for example, four elongated cylindrical openings (not shown) configured to receive four wires of the working portion **112**.

[**0053**] The working portion **112** is a wire-frame wisk that is approximately 0.900 inches to 1.250 inches in length. The working portion **112** includes a first wire **114** and a second wire **116**. The first wire **114** includes a first end **118** and a second end **120** that are connected to the shaft-receiving portion **110**. Similarly, the second wire **116** includes a first end **122** and a second end (not shown) that are connected to the wire-receiving portion **111** of the body **108**. Together, the first wire **114** and the second wire **116** are shaped such that the working portion **112** includes an upper portion **124**, a waist portion **126**, and a lower portion **128**. In one variation, the working portion **112** includes only a waist portion and a lower portion. The length of the upper portion **124** is approximately 0.150 inches, the length of the waist portion **126** is approximately 0.600 inches, and the length of the lower portion **128** is approximately 0.450 inches.

[**0054**] A cross-section of the upper portion **124** is depicted in **FIG. 15**. It can be seen that the spacing between the wires is kept relatively small. As mentioned above, the portion of the wisk is designed to be connected to the wire-receiving portion **111**. Since it is desirable to keep the wire-receiving portion **111** as slim as possible in order to not interfere with the operation of the wisk, the distance between the wires in the upper portion **124** is minimized as much as possible.

[**0055**] A cross-section of the waist portion **126** is depicted in **FIG. 16**. This cross-section of **FIG. 16** illustrates an area B that is encompassed and defined by the virtual circle formed by the first and second wires **114**, **116** at the waist portion **126** as they rotate. Area B is substantially constant along the length of the waist portion **126**. Area B is approximately 0.057 inches^2 to approximately 0.060 inches^2.

[0056] A cross-section of the lower portion **128** is depicted in **FIG. 17**. The cross-section of **FIG. 17** illustrates an area C that is encompassed and defined by the virtual circle formed by first and second wires **114**, **116** at the lower portion **128** as they rotate. As can be seen in **FIG. 12**, the lower portion **128** does not have a constant area C. Instead, area C increases with distance towards the second end **104**. The lower portion **128** of first and second wires **114**, **116** are formed in a trapeze shape with lateral angles ω such that the wire frame of the lower portion **128** is similar to a truncated pyramid in shape. The area C at the widest point of the pyramid is approximately 0.48 inches^2 to approximately 0.50 inches^2. As can be seen in FIGS. **16-17**, the area B of the waist portion **126** is smaller relative to the area C of the lower portion **128**. In one variation of the working portion **112**, there is only a waist portion **126** and a lower portion **128** such that the waist portion **126** directly fits into the wire-receiving portion **111** of the body **108**.

[0057] The working portion **112** provides a wire frame that is useful for frothing warm milk. When at least partially immersed into a liquid product, the processing tool **100**, when rotatingly engaged induces air into the liquid. Air is induced into the liquid by the working portion **112**. In particular, air and foodstuffs is channeled from the waist portion **126** downwardly into the lower portion **128**. The virtual cylinder of cross-section B along the length of the waist portion **126** acts as an airshaft communicating with the virtual truncated cone of varying cross-section C of the lower portion **128**. This working portion **112** is particularly advantageous because the induction of air into the liquid is accomplished with minimal spinning of the liquid because of the wire frame construction. Furthermore, frothing or foaming of the liquid takes place at the lowest possible point of immersion without dragging the entire body of milk along with the rotating processing tool **100**. It should be noted that the diameter of the wires is approximately 0.03 inches. These small diameter wires slice through the liquid with relatively minimal drag force, thereby, leaving the body of milk relatively stationary. This action permits the warm milk to foam. If the warm milk were to rotate along with the wisk, then the foam would have been reabsorbed in to the liquid milk due to it being warm. The result would not have been satisfactory, namely very little foam, if any, would have remained.

[0058] Referring now to FIGS. **18-21**, there is depicted a blender and processing bowl system **150**. The blender and processing bowl system **150** includes a hand-held blender **152** and a processing bowl or container **154**. The blender **152** includes a body **156** coupled to a processing tool **158**. The body **156** includes an elongated, tubular housing shaped to comfortably fit in a person's hand. A motor (not shown) is located inside the body **156**. The motor is manually actuated by a actuator **160** conveniently located at the top of the body **156**. The processing tool **158** includes a shaft **162** and is removably attached to the body **156**. The processing tool **158** includes a working portion **164**.

[0059] The container **154** includes a sidewall **170** interconnected to a base **174**, and a lid **168**. The sidewall **170** and base **174** define an interior **172** and an opening **176** of the container **154**. The container **154** further includes a stand **153** spout **178** having a spout opening **180**. The base **174** of the container **154** is concave with respect to the interior **172** of the container **154**. The container **154** further includes markings **179** denoting graduations of fluid volume. For example, markings **179** denoting the number of cups, tablespoons, ounces, pints, teaspoons and milliliters can all be included on the container **154**.

[0060] The lid **168** is adapted to mate with the container **154** at the opening **176** to substantially cover the opening **176**. The lid **168** includes a blender opening **182** and a lip **184** as shown in FIGS. **20-21**. The blender opening **182** is adapted to receive a blender **152** as shown in **FIG. 18**. The lip **184** is adapted to cover the spout opening **180**.

[0061] The blender and processing bowl system **150** is employed such that foodstuffs are entered into the container **154** via opening **176**. Also, the processing bowl **154** is adapted such that foodstuffs can be entered via the blender opening **182** when with the lid **168** is in place on the container **154**. Additionally, foodstuffs can be entered via the spout opening **180**. In one variation, to enter food via the spout opening **180**, the lid **168** is rotated so that the lip **184** does not cover the spout opening **180**. The quantity of foodstuffs placed inside the container is measured via the markings **179** on the sidewall **170**. The lid **168** is movable with respect to the container **154** such that the user navigates the lip **184** of the lid **168** into a position in which the lip **184** covers the spout opening **180** if so desired. In the variation in which the lid **168** is substantially circular, the lid **168** rotates with respect to the container **154**. Thereby, the lip **184** serves to close the spout opening **180** to prevent foodstuffs from escaping the container **154** via the spout **178** especially when the blender **152** is engaged and the processing tool **158** is rotating and mixing the contents of the processing bowl **154**. A blender **152** is inserted into the processing bowl **154** through the blender opening **182**. The blender opening **182** is adapted to receive the blender **152** such that the body **156** of the blender **152** rests against the lid **168** at the blender opening **182**. With the blender **152** resting against the lid **168** at the blender opening **182**, the user is free let go of the blender **152**. The blender and processing bowl system **150** is adapted such that the blender and processing bowl system **150** will not tip-over when the user leaves the blender **152** unattended. Also, the user does not have to worry about the blender **152** falling or slipping deeper into the processing bowl **154**. The lid **168** keeps the blender **152** in place. In fact, the blender and processing bowl system **150** is adapted such that, with the blender **152** resting against the lid **168** at the blender opening **182**, the blender **152** is ideally positioned within the processing bowl **154** such that the working portion **164** of the processing tool **158** is spaced from the base **174** by an operable distance of approximately 0.100 inches to approximately 0.200 inches. The user does not have to worry about keeping the blender **152** a particular distance from the base **174** to keep the processing tool **158** in an operable location.

[0062] Furthermore, in one variation, at least a portion of the processing tool **158** is positioned within the concavity of the base **174** when the blender **152** rests against the lid **168** at the blender opening **182**. In this position, the rotating processing tool **158** in conjunction with the concavity of the base **174** direct foodstuffs upwardly and away from the base **174** to enhance mixing.

[0063] In one variation, the processing bowl **154** is adapted such that the lip **184** partially covers the spout opening **180** allowing small amounts of foodstuffs to be

entered into the processing bowl **154** via the spout opening **180**. In yet another use of the blender and processing bowl system **150**, the lid **186** may be rotated away from the spout **178** such that the lip **184** does not cover the spout opening **180**, thereby, permitting foodstuffs to be entered into the processing bowl **154**. Whether or not the lip **184** is adapted to completely or partially cover the spout opening **180**, the blender and processing bowl system **150** permits entry of foodstuff via the spout opening **180** during the blending process with the blender **152** engaged without necessitating the halting or removal of the blender **152**. For example, oil or other foodstuffs can be slowly drizzled into the processing bowl **154** via the spout **178** and spout opening **180** while continuing to mix the ingredients in the container **154**. The spout **178** serves as a catchment large enough for the entry of foodstuffs. Also, with the blender **152** resting against at least a portion of the lid **168**, one can engage the blender **152** with one hand without manually adjusting the height of the blender **152** with respect to the base **174**. Hence, the user's other hand is freed to enter ingredients or perform other kitchen tasks.

[**0064**] With reference to **FIGS. 1, 22, 23**A, **23**B and **23**C, a mechanism **200** for two-speed operation in a battery-operated hand-held blender will now be discussed. The mechanism **200** includes a battery cartridge **202** configured to receive batteries **204**. The battery cartridge includes a first end **201** and a second end **203**. The battery cartridge **202**, for example, is designed to receive four AA-sized batteries **204** having 1.5 volts each; however, the invention is not so limited. The batteries **204** are internally wired to produce a direct current having a total voltage of approximately six volts. The battery cartridge **202** further includes terminals **206** and **208** at the second end **203**. The terminals **206**, **208** extend outwardly from the second end **203** of the battery cartridge **202**. The battery cartridge **202** is removably received inside the housing **16**. The battery cartridge **202** further includes a protrusion **210** that is encompassed by a collar **212**. The protrusion **210** and collar **212** are integrally molded with the battery cartridge **202**. The cylindrically shaped protrusions **210** and collar **212** define a spring-receiving portion **214** that is also cylindrical in shape. The spring-receiving portion **214** is adapted to receive a helical first spring **216**. The first spring **216** is sized such that when the first spring **216** is inserted into the spring-receiving portion **214**, the first spring **216** is retained therein in a friction fit engagement. Other means such as adhesives or a catch may be employed to affix the first spring **216** to the battery cartridge **202**. The mechanism **200** includes a second spring **218**. The second spring **218** is mounted on the exterior surface of the collar **212**. The second spring **218** is sized to be slightly smaller than the outer surface of the collar **212** such that when the second spring **218** is mounted on the collar **212**, the second spring **218** is slightly expanded to create a biasing force against the collar **212** to engage the exterior surface of the collar **212** and to be retained thereto in a friction-fit engagement.

[**0065**] As described above, the housing **16** includes a motor **15** that rotatably drives the collet **20** and the processing tool **14** attached thereto. The blender **10** includes motor locating ribs **219** that hold the motor **15** in place. A circuit board **221** that is electrically connected to the motor **15** is located between the motor **15** and the battery cartridge **202** and is centered about the motor bearing cap **220**. The circuit board **221** includes a resilient first contact **222**, a resilient second contact **223**, a third contact **224** and at least one resistor **225**. First resilient contact **222** is located above third contact **224** as shown in **FIGS. 22 and 23**.

[**0066**] The battery cartridge **202** is fitted with the first spring **216** by tightly wedging it into the spring-receiving portion **214**. The second spring **218** is then mounted to the exterior surface of the collar **212**. Batteries **204** are then inserted into the cartridge **202**. With the top of the blender housing **16** removed, the battery cartridge **202** is inserted into the housing **16**. The first spring **216** contacts the motor housing **220** spacing the battery cartridge **202** such that the cartridge terminals **206**, **208** do not contact the first contact **222** and the second contact **223** as shown in **FIG. 23A**. The actuator **18** is captured within a retainer ring **19** to close the housing **16** in a snap-fit engagement. The battery cartridge **202** is thereby secured inside the housing **16**.

[**0067**] To activate the blender **10**, the actuator **18** is depressed. Depressing the actuator **18** pushes the battery cartridge **202** downwardly to a first position in which the first spring **216** is compressed and the terminals **206**, **208** contact the first and second resilient contacts **222** and **223**, respectively, as shown in **FIG. 23C**. Power is thereby delivered to the motor **15** when such contact is made and the motor **15** is actuated. Resilient first contact **222** is electrically connected to a first motor terminal **227** through a resistor **225**. Resilient second contact **223** is electrically connected to a second motor terminal **229**. When the battery terminals **206**, **208** make contact with first contacts **222**, **223**, a voltage equal to the battery voltage less the voltage drop across the resistor **225** is delivered to the motor **15** as illustrated by the equation $V_{motor}=V_{battery}-(R_{resistor}\times I_{motor})$. Therefore, less than the full battery voltage is delivered to the motor and the motor operates at a lower speed setting while the battery cartridge **202** is in the first position.

[**0068**] To operate the blender **10** at higher speeds, the actuator **18** is further depressed. Depressing the actuator **18** further downwardly, pushes the battery cartridge **202** further downwardly. Because the resilient contact **222** is resilient, it will flex back and forth like a spring. When flexed downwardly, resilient contact **222** contacts the third contact **224** to define a second position. When the first resilient contact **222** contacts the third contact **224**, the resistor **225** is shunted out of the circuit and the full battery voltage is delivered to the motor **15** resulting in the motor **15** running at a higher speed than when a lower voltage was delivered to the motor **15** when the resistor **225** was in the circuit with the battery cartridge **202** in the first position. The second contact **223** being resilient also flexes downwardly and springs back upwardly as shown in **FIG. 23**. In a variation in which the second contact **223** does not flex, the second cartridge terminal **208** would have to be sufficiently flexible such that terminal **208** would contact second contact **223** throughout the first and second positions.

[**0069**] In order to make it more obvious to the user that the operation shifts from low speed to high speed, the second spring **218** is engaged when the battery cartridge **202** is pushed beyond the first position. The first spring **216** is longer than the second spring **218** as shown in **FIG. 22**. However, the invention is not so limited and the first spring **216** need only extend a greater distance from the second end **203** of the battery cartridge **202** relative to the second spring **218**. The user will notice that additional force is required to

press actuator **18** past the first position. This additional force due to the resistance provided by the second spring **218** indicates shifting of the rotational speed of the motor.

[**0070**] A light emitting diode **226** is also connected, physically and electrically to the printed circuit board **221**. The light emitting diode **226** is activated when the battery terminals **206**, **208** make electrical contact with the printed circuit contacts **222**, **223**. Alternatively, the light emitting diode **226** is activated when the high speed is chosen.

[**0071**] Releasing pressure on the actuator **18** allows the spring forces generated by first and second springs **216**, **218** to push the battery cartridge **202** upwardly away from the motor **15** and circuit board **221**. Since contact **222** is resilient, it will flex back towards a relaxed position away from the third contact **224** and current will flow through the resistor **225** in this first position wherein the resulting rotational speed of the motor is slower due less voltage being delivered to the motor **15**. In this way, the user can conveniently operate the blender **10** between the two speeds, pressing and releasing the actuator **18** between the first and second positions to achieve the variation in speed. Further relaxation of actuator **18**, will drive the battery cartridge **202** further upwardly via the spring force from the first spring **216** until the terminals **206** and **208** no longer contact the contacts **222**, **223**, thereby, cutting-off current from the motor.

[**0072**] While the present invention has been described with reference to one or more particular variations, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. Each of these embodiments and obvious variations thereof are contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.

1. A blender comprising:

a processing tool having a shaft;

a body including:

a motor;

a collet for removably coupling the processing tool to the motor; the collet being connected to the motor at a first end; the collet including a collet body and at least two extensions forming a shaft-receiving portion at a second end; and

a spring connected to the collet body such that the spring forces the at least two extensions inwardly;

wherein the shaft of the processing tool is received within the shaft-receiving portion to bias the at least two extensions outwardly to form a friction-fit engagement to secure the processing tool.

2. The blender of claim 1 wherein the collet body includes a third extension; the three extensions forming the shaft-receiving portion.

3. The blender of claim 1 wherein the motor includes a drive shaft and the collet body includes a bore at the first end for receiving the drive shaft; the collet being secured to the drive shaft.

4. The blender of claim 1 wherein the extensions have an inner surface shaped to conform to the shaft when coupled.

5. The blender of claim 1 wherein the extensions substantially encompass the shaft.

6. A processing tool for a blender comprising:

a shaft configured to couple to a blender at a first end;

a body connected to the shaft at a second end; the body having a working portion; the working portion having a top surface and a bottom surface interconnected by a sidewall; the working portion includes at least a first opening extending between the top surface and the bottom surface; the first opening includes a leading end interconnected to a trailing end; wherein at least a portion of the trailing end forms an angle with the bottom surface that is less than 90 degrees.

7. The processing tool of claim 6 wherein at least a portion of the leading end forms an angle with the top surface that is less than 90 degrees.

8. The processing tool of claim 6 wherein the processing tool is adapted for rotation such that the leading end leads in the rotation.

9. The processing tool of claim 6 wherein the top surface is parallel to the bottom surface.

10. The processing tool of claim 6 wherein the working portion is substantially circular in shape.

11. The processing tool of claim 6 wherein the body includes a shaft-receiving portion; the shaft being received within the shaft-receiving portion.

12. The processing tool of claim 6 wherein the leading end of the opening is curved.

13. The processing tool of claim 6 wherein the first opening includes an outer side interconnected to an inner side.

14. The processing tool of claim 13 wherein the outer side of the first opening is curved.

15. The processing tool of claim 13 wherein the outer side of the first opening is substantially parallel to the sidewall.

16. The processing tool of claim 13 wherein the inner side of the first opening is curved.

17. The processing tool of claim 13 wherein at least a portion of the inner side extends between the top surface and the bottom surface at an angle of less than 90 degrees with respect to the bottom surface.

18. The processing tool of claim 13 wherein at least a portion of the outer side extends between the top surface and the bottom surface at an angle of less than 90 degrees with respect to the bottom surface.

19. The processing tool of claim 13 wherein at least a portion of the outer side extends between the top surface and the bottom surface at an angle of approximately 80 degrees to approximately 90 degrees with respect to the bottom surface.

20. The processing tool of claim 13 wherein at least a portion of the leading end extends between the top surface and the bottom surface at an angle that is less than 90 degrees with respect to the top surface; wherein at least a portion of the outer side extends between the top surface and the bottom surface at an angle that is less than 90 degrees with respect to the bottom surface; and wherein at least a portion of the inner side extends between the top surface and the bottom surface at an angle that is less than 90 degrees with respect to the bottom surface.

21. The processing tool of claim 13 wherein at least a portion of both the outer side and the inner side form the trailing end.

22. The processing tool of claim 6 wherein the leading end is wider than the trailing end such that the first opening narrows from the leading end towards the trailing end.

23. The processing tool of claim 6 further including a second opening extending between the top surface and the bottom surface; the second opening includes a leading end interconnected to a trailing end; wherein at least a portion of the trailing end forms an angle with the bottom surface that is less than 90 degrees.

24. The processing tool of claim 23 wherein at least a portion of the leading end of the second opening forms an angle with the top surface that is less than 90 degrees.

25. The processing tool of claim 23 wherein the second opening includes an outer side interconnected to an inner side.

26. The processing tool of claim 25 wherein the outer side of the second opening is curved.

27. The processing tool of claim 25 wherein the outer side of the second opening is substantially parallel to the sidewall.

28. The processing tool of claim 25 wherein the inner side of the second opening is curved.

29. The processing tool of claim 25 wherein at least a portion of the inner side extends between the top surface and the bottom surface at an angle of less than 90 degrees with respect to the bottom surface.

30. The processing tool of claim 25 wherein at least a portion of the outer side extends between the top surface and the bottom surface at an angle of less than 90 degrees with respect to the bottom surface.

31. The processing tool of claim 25 wherein at least a portion of the outer side extends between the top surface and the bottom surface at an angle of approximately 80 degrees to approximately 90 degrees with respect to the bottom surface.

32. The processing tool of claim 25 wherein at least a portion of the leading end extends between the top surface and the bottom surface at an angle that is less than 90 degrees with respect to the top surface; wherein at least a portion of the outer side extends between the top surface and the bottom surface at an angle that is less than 90 degrees with respect to the bottom surface; and wherein at least a portion of the inner side extends between the top surface and the bottom surface at an angle that is less than 90 degrees with respect to the bottom surface.

33. The processing tool of claim 25 wherein at least a portion of both the outer side and the inner side form the trailing end.

34. The processing tool of claim 25 wherein the leading end is wider than the trailing end such that the first opening narrows from the leading end towards the trailing end.

35. The processing tool of claim 6, wherein the first opening includes a shape selected from the group consisting of a paisley shape, a tear-drop shape, a circle, and a triangle.

36. A processing tool for a blender comprising:

a shaft configured to couple to a blender at a first end;

a body connected to the shaft at a second end; the body having a working portion; the working portion including a wire frame having an first portion interconnected to a second portion; the first portion being closer to the first end than the second portion; the first portion being connected to the body; wherein as the wire frame rotates, the wire frame defines a cross-sectional area at the first portion that is smaller than the cross-sectional area defined by the wire frame at the second portion; wherein the cross-sectional area defined by the wire frame at the first portion is substantially constant throughout the upper portion; and wherein the cross-sectional area defined by the wire frame at the second portion increases with distance towards the second end.

37. The processing tool of claim 36 wherein the wire frame includes a first wire and a second wire; the first wire having a first and a second end; the second wire having a first and a second end; wherein the ends of the first and second wire are connected to the body.

38. The processing tool of claim 36 wherein the wire frame includes a third portion located between the first portion and the second portion; wherein as the wire frame rotates, the wire frame defines a cross-sectional area at the third portion that is smaller than the cross-sectional area defined by the wire frame at the second portion; and wherein the cross-sectional area defined by the wire frame at the third portion is larger than the cross-sectional area defined by the wire frame at first portion.

39. The processing tool of claim 38 wherein the cross-sectional area defined by the third portion is substantially constant throughout the waist portion.

40. The processing tool of claim 36 wherein the wire frame of the second portion defines a pyramid-like shape.

41. A container for use with a hand-held blender having a processing tool attached thereto comprising:

a sidewall interconnected to a base; the sidewall and base defining an interior and an opening; and

a lid adapted to be received in the opening; the lid includes a blender opening configured to insert the hand-held blender therethrough and into the container interior;

wherein the container is adapted to rest the blender against the lid at the blender opening such that the processing tool of the blender is spaced from the base.

42. The container of claim 41 wherein the base is concave with respect to the interior.

43. The container of claim 42 wherein at least a portion of the working portion is located within the concavity of the base.

44. The container of claim 41 wherein the sidewall includes a spout defining a spout opening.

45. The container of claim 44 wherein the lid includes a lip adapted to at least partially cover the spout opening.

46. A blender comprising:

a processing tool;

a housing;

a motor located within the housing; the processing tool being coupled to the motor to be rotalably driven by the motor; the motor includes a first motor terminal and a second motor terminal;

a battery cartridge located within the housing; the battery cartridge adapted to receive at least one battery; the battery cartridge having a first end and a second end; the battery cartridge including a first cartridge terminal and a second cartridge terminal at the second end;

a actuator coupled to the first end of the battery cartridge;

a circuit board located between the motor and the battery cartridge; the circuit board being adapted to electrically connect to the at least one battery to power the motor; the circuit board including a resilient first contact, a resilient second contact; a third contact, and at least one resistor; wherein the resilient first contact is electrically connected to the first motor terminal through the resistor; the resilient second contact is electrically connected to the second motor terminal; the third contact is electrically connected to the first motor terminal; the resilient first contact being located above the third contact;

a first spring attached to the battery cartridge; the first spring extending from the second end of the battery cartridge;

wherein the battery cartridge is spaced from the circuit board by the first spring such that the blender is not activated;

wherein depressing the actuator compresses the first spring to a first position in which the first cartridge terminal and the second cartridge terminal are in contact with the resilient first contact and the resilient second contact, respectively, to activate the motor to rotate the processing tool at a first speed;

wherein depressing the actuator further compresses the first spring further to a second position in which the resilient first contact is flexed to contact the third contact to activate the motor to rotate the processing tool at a second speed; the second speed being greater than the first speed due to the resistor being shunted out of the circuit when the resilient first contact contacts the third contact.

47. The blender of claim 46 wherein the battery cartridge includes a protrusion and a coaxial collar encompassing the protrusion to define a spring-receiving portion therebetween; the first spring being secured in the spring-receiving portion.

48. The blender of claim 46 further including a second spring; the second spring extending from the second end of the battery cartridge by a shorter distance relative to the first spring such that the second spring is engaged when in the second position.

49. The blender of claim 47 further including a second spring; the second spring extending from the second end of the battery cartridge by a shorter distance relative to the first spring; wherein the second spring is coaxial relative to the first spring; the second spring being secured to the collar; the second spring is engaged when in the second position.

50. The blender of claim 47 wherein releasing pressure on the actuator allows the spring force generated by the first spring to push the cartridge away from the motor such that the resilient first contact flexes towards a first position in which the resilient first contact does not contact the third contact; the first and second cartridge terminals contacting the resilient first contact and the resilient second contact to activate the motor at the first speed.

51. The blender of claim 50 wherein further releasing pressure on the actuator allows the spring force generated by the first spring to push the cartridge further away from the motor such that at least one of the first and second cartridge terminals does not contact at least one of the resilient contacts.

52. The blender of claim 46 wherein the second cartridge terminal is resilient such that it flexes when contacting the second contact.

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