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(54) KITCHEN STAND MIXER AND SHAFT HEIGHT ADJUSTMENT MECHANISM FOR A KITCHEN STAND MIXER

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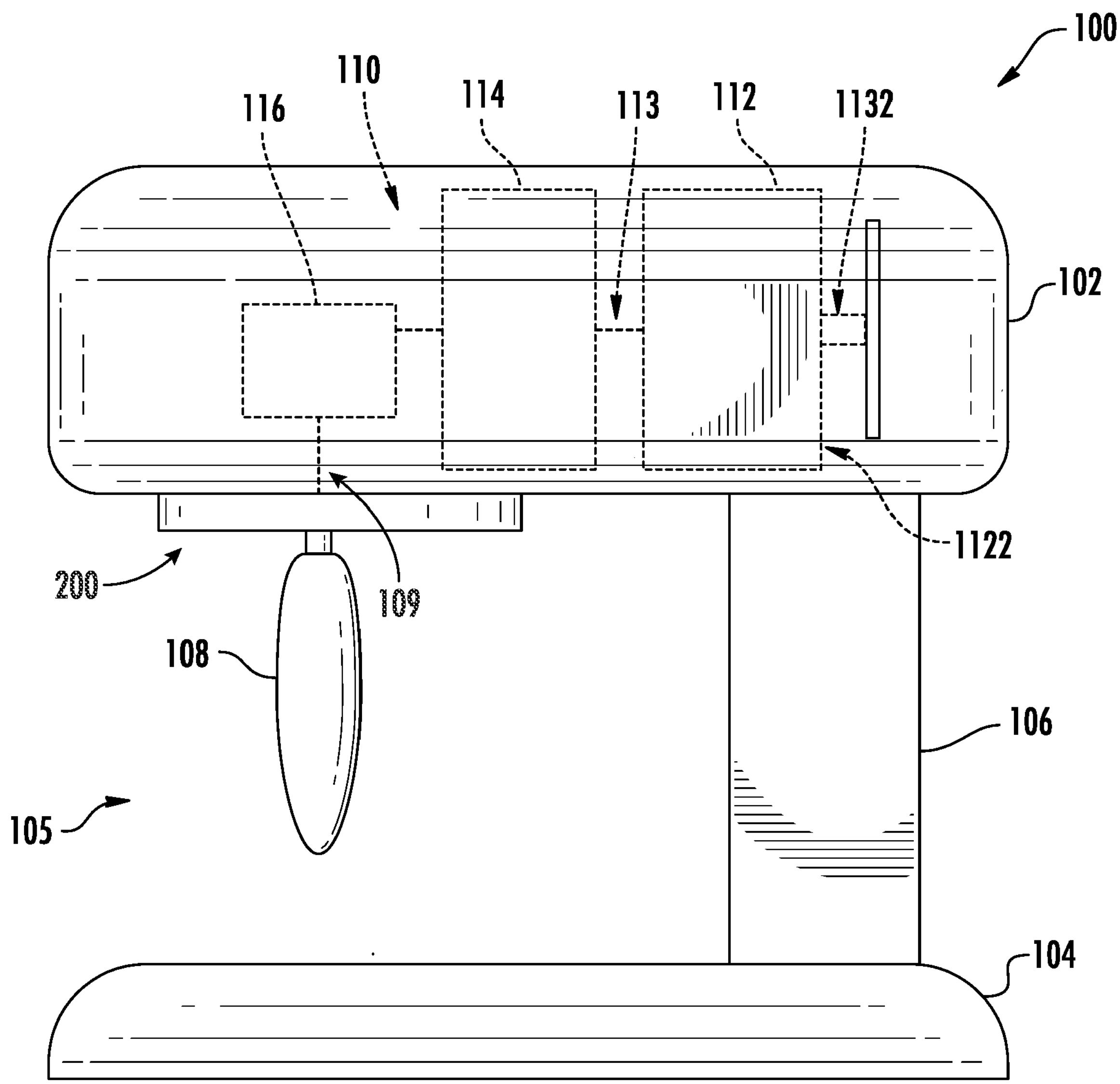
(57) **ABSTRACT**

A shaft adjustment assembly for a domestic appliance, the domestic appliance comprising a drive shaft, the shaft adjustment assembly includes an output shaft adjustably coupled to the drive shaft and including a chuck protrusion extending therefrom; a clutch cover positioned around the output shaft, the clutch cover being movable along the axial direction; at least one clutch pin operably coupled with the clutch cover, the at least one clutch pin selectively penetrating each of the drive shaft and the output shaft; a chuck sleeve positioned around the chuck protrusion, the chuck sleeve being movable with respect to the chuck protrusion; and a catch received within the chuck protrusion, the catch being movable between an engaged position and a recessed position.



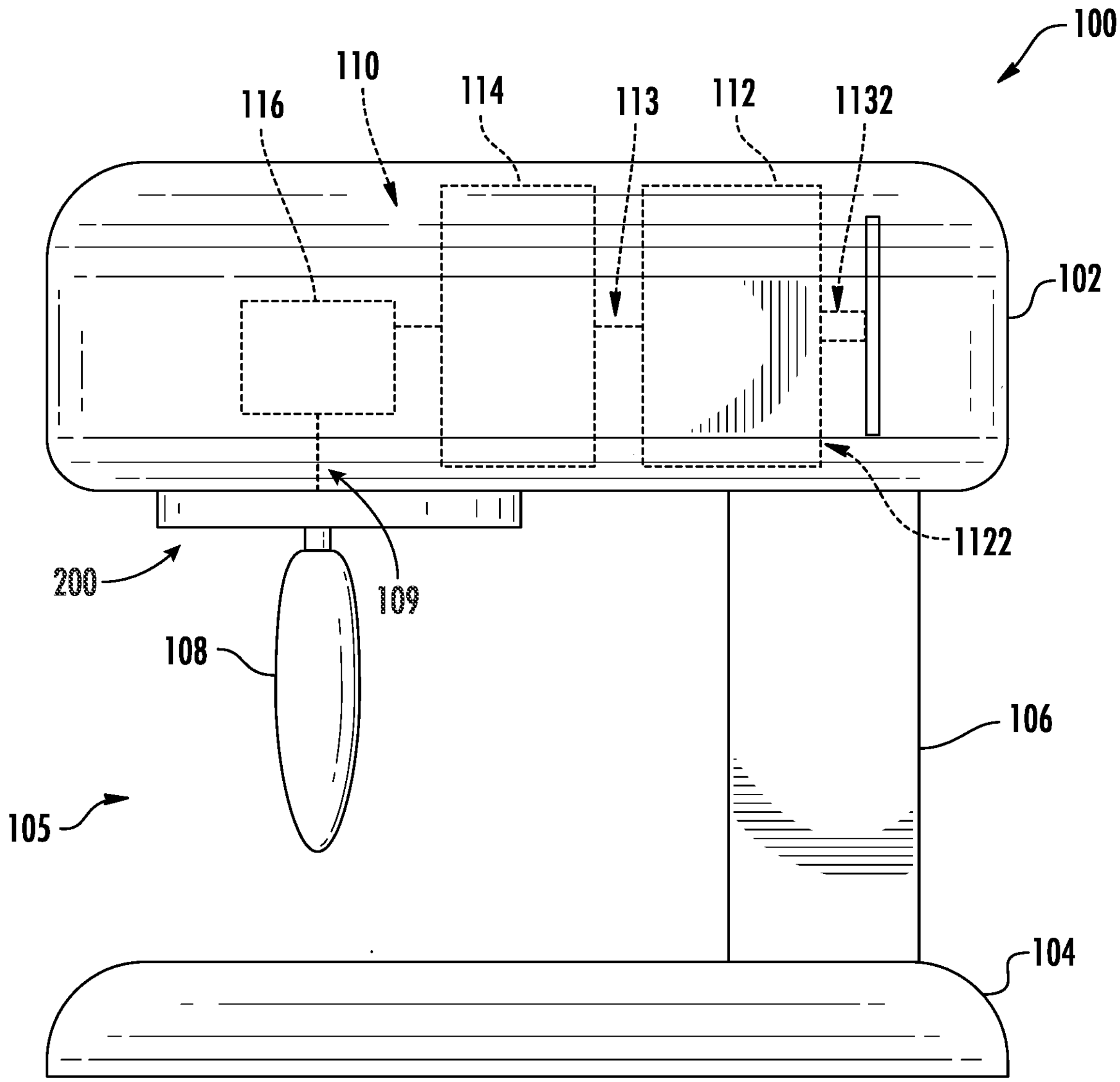


FIG. 1

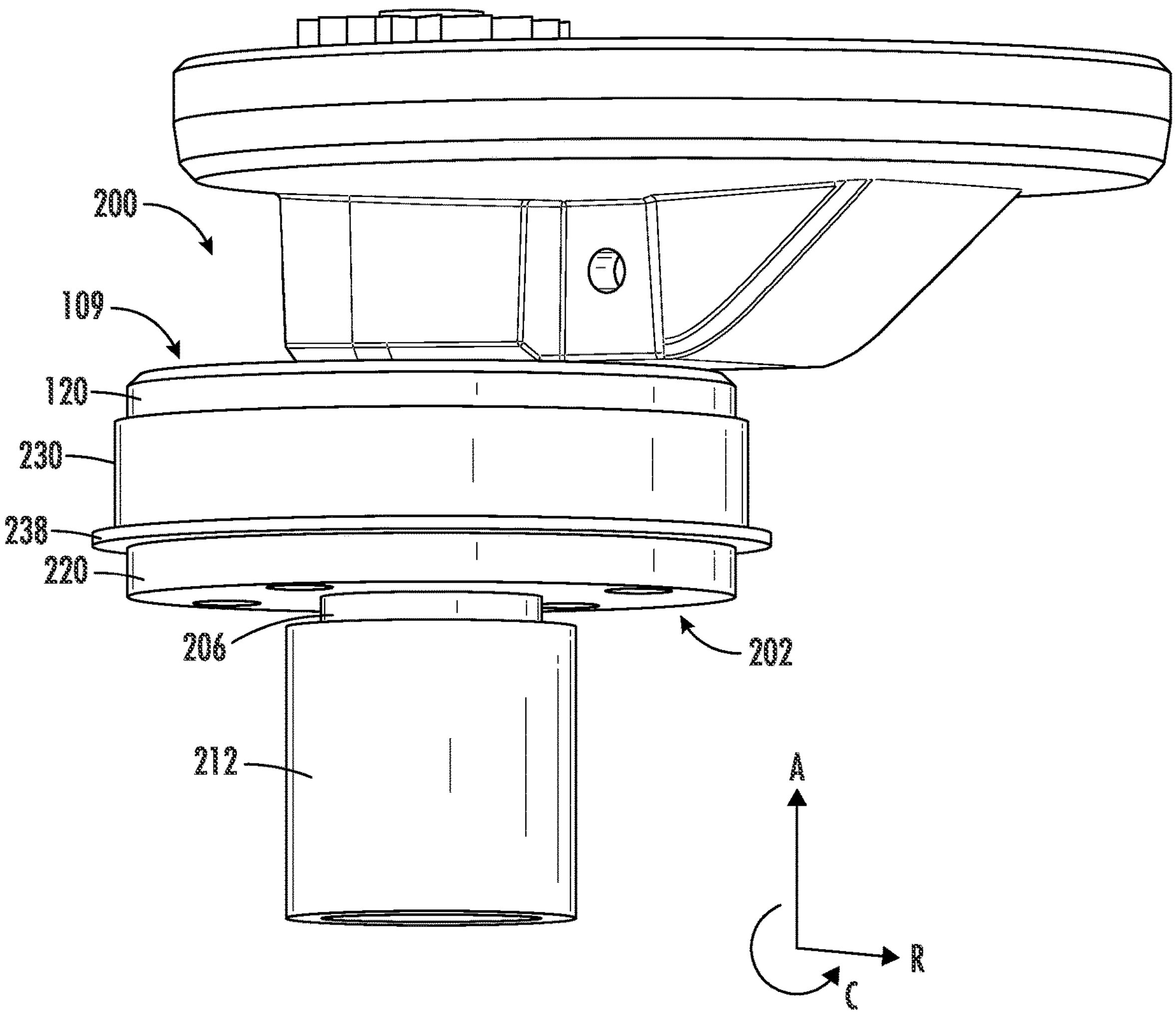


FIG. 2

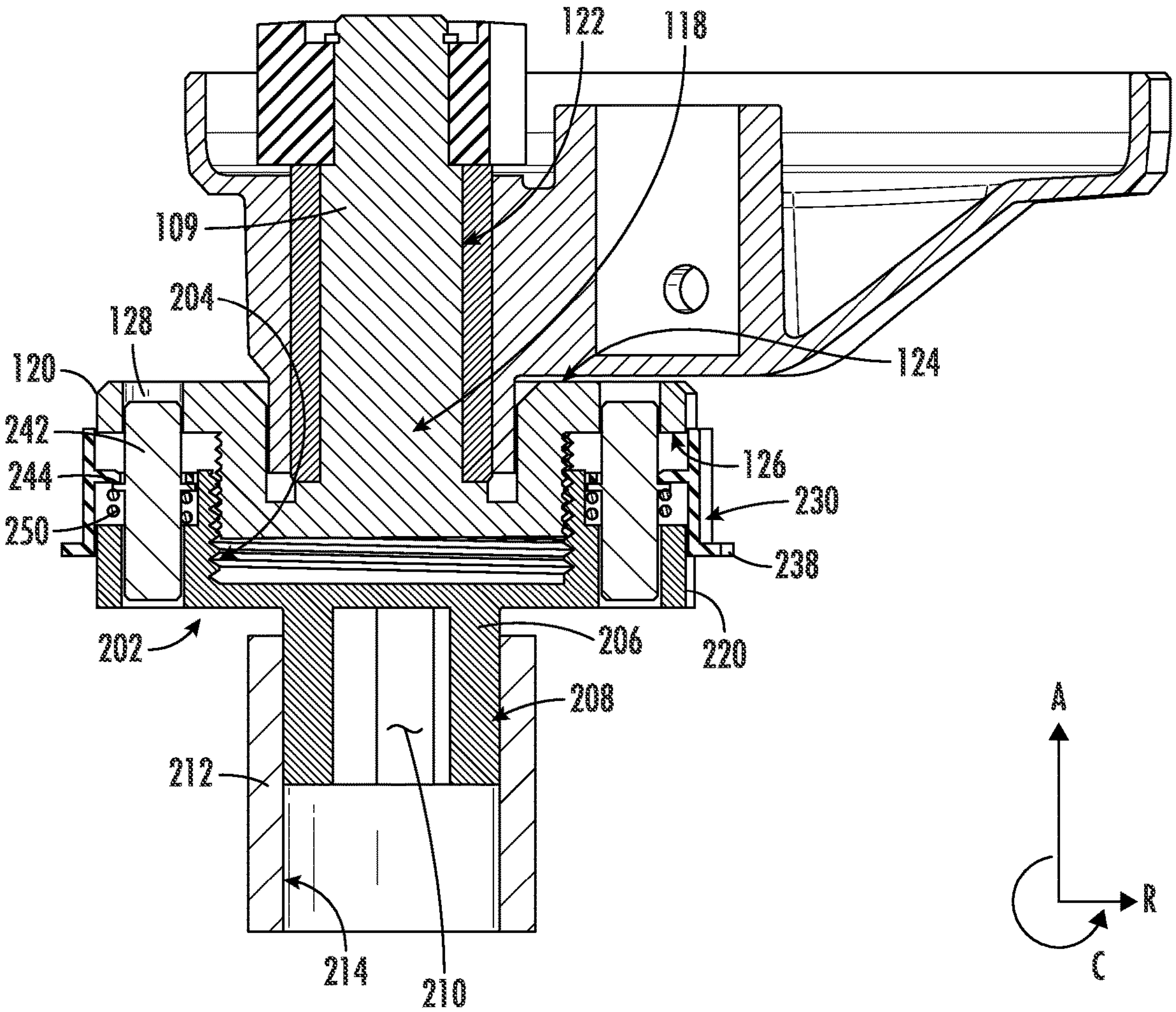

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FIG. 3

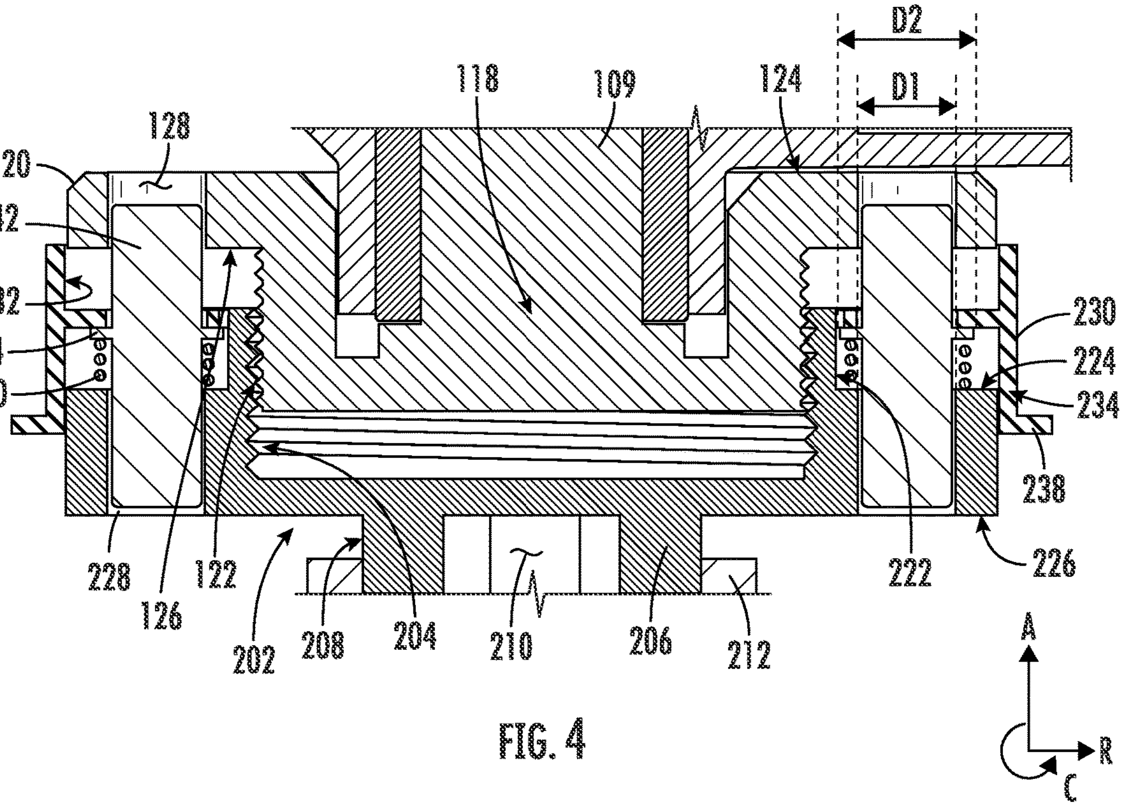
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FIG. 4

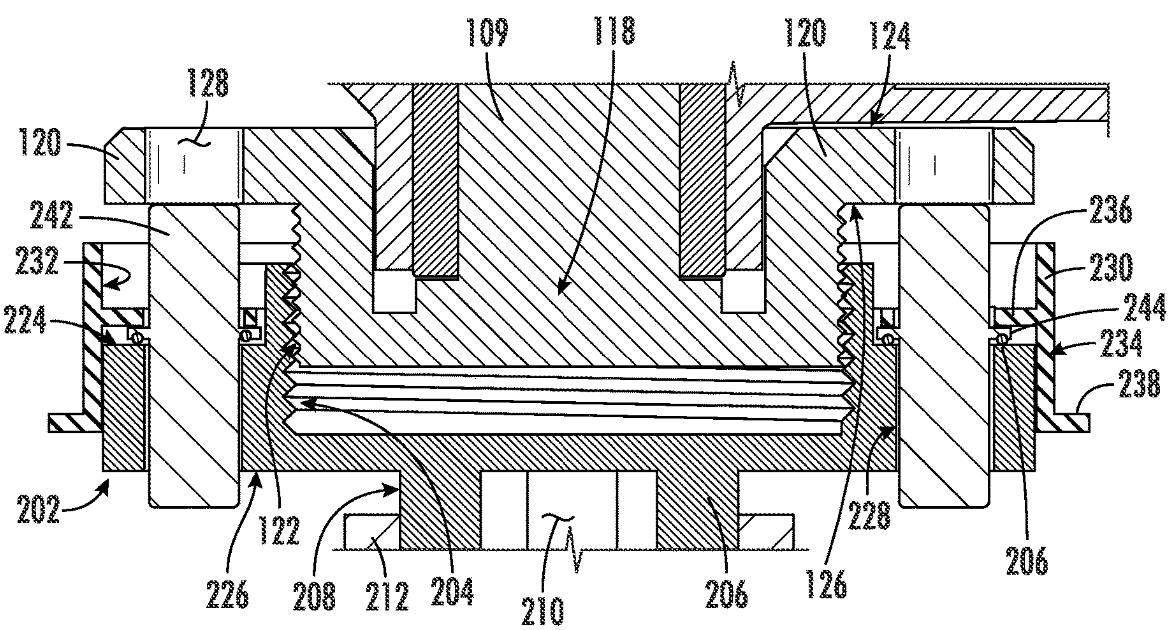
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FIG. 5

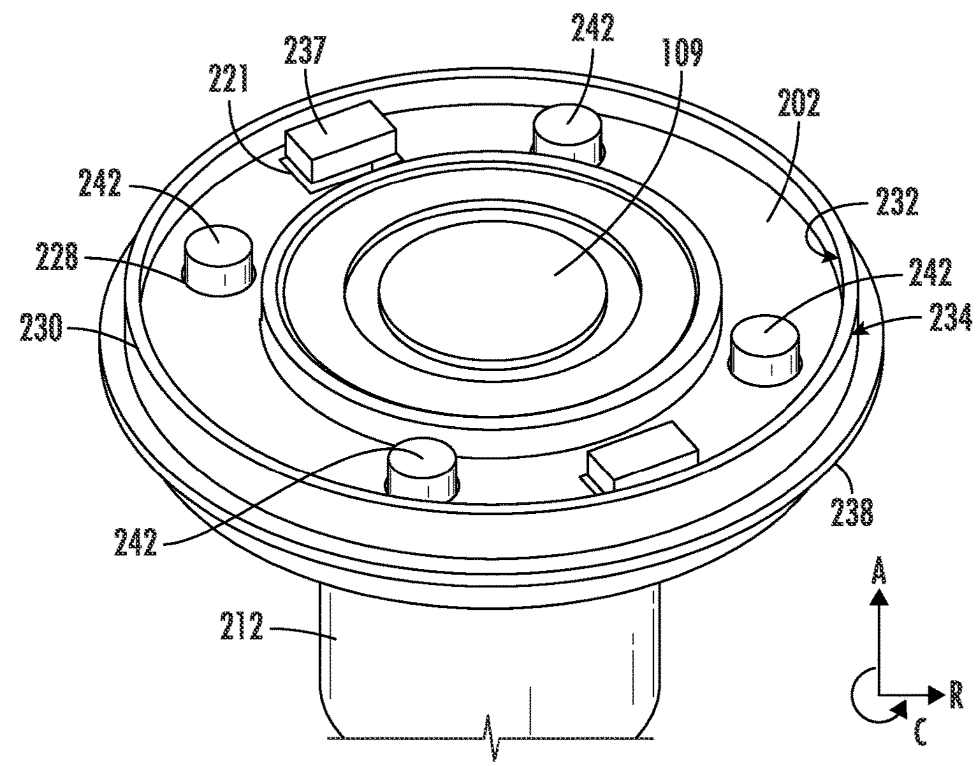
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FIG. 6

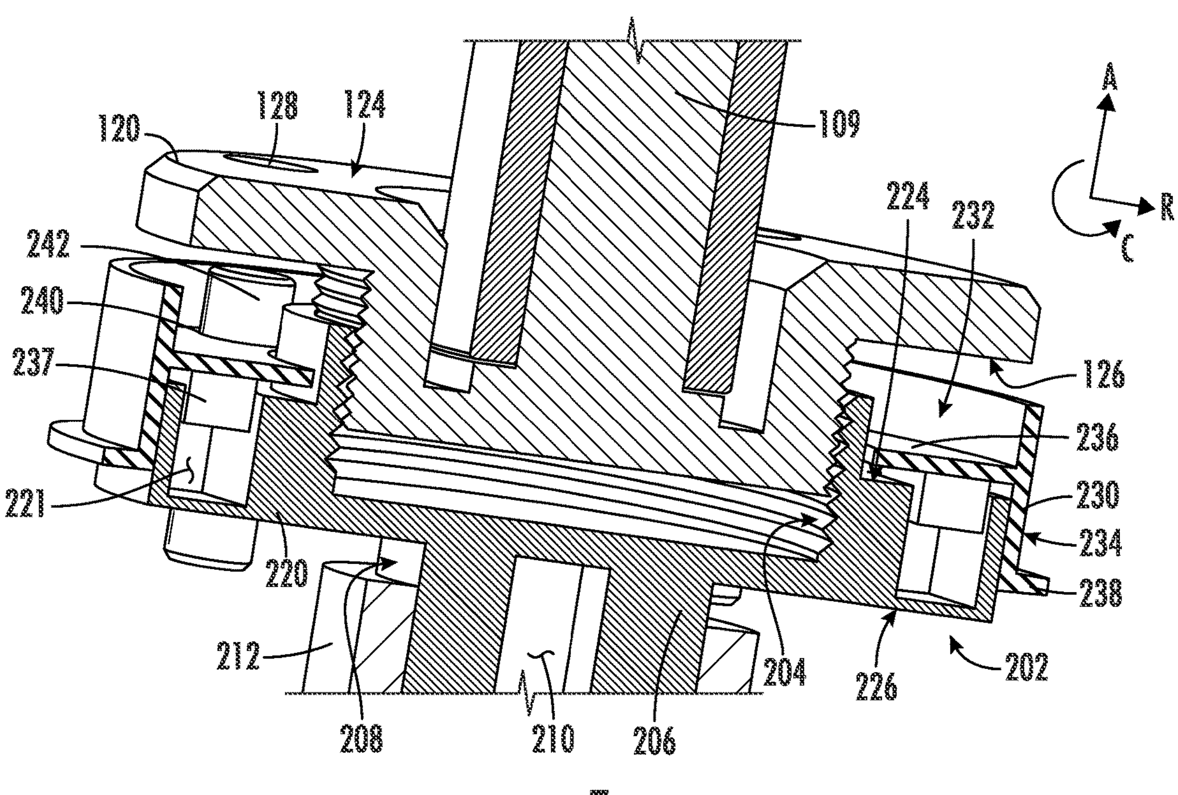
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FIG. 7

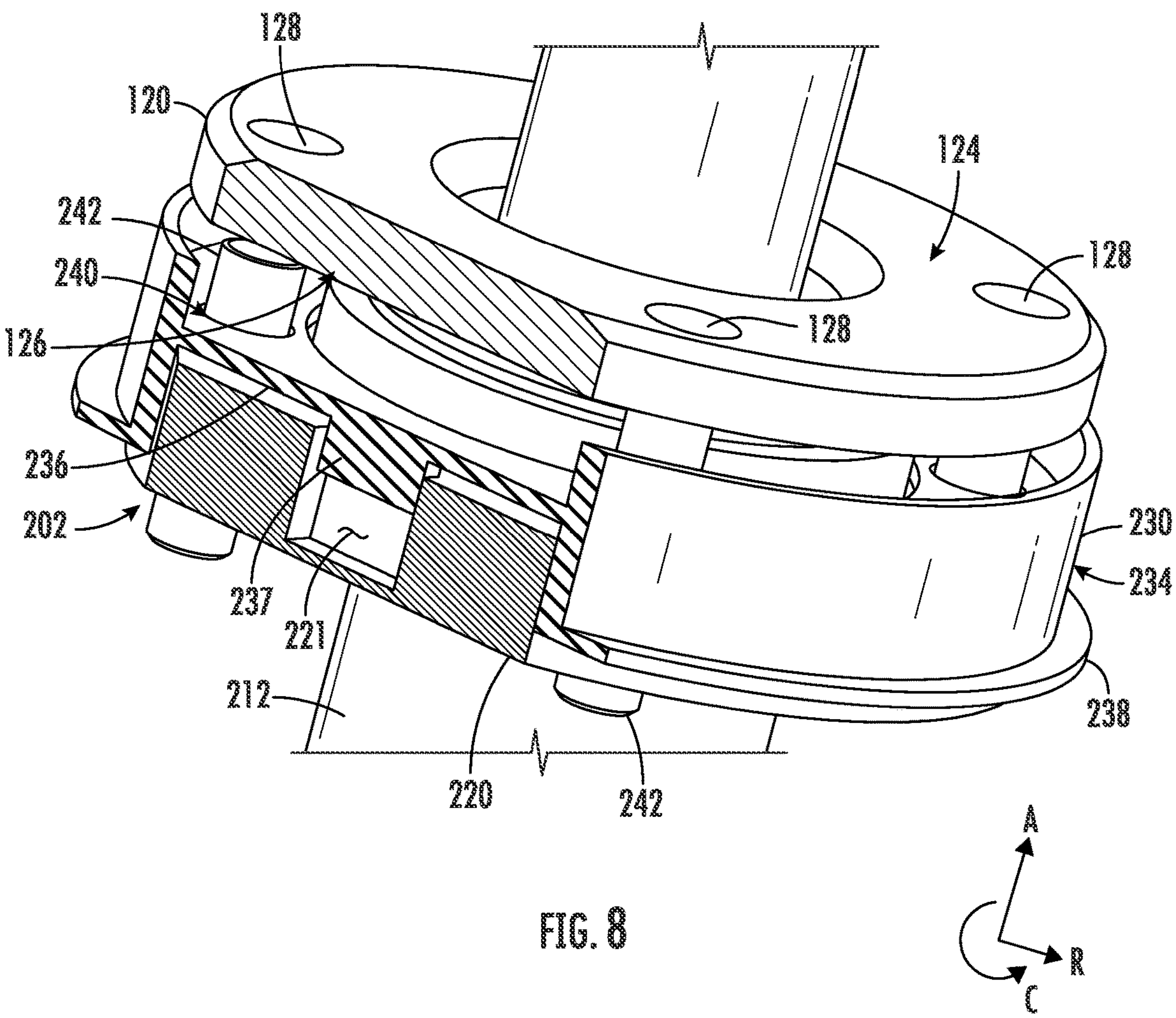
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FIG. 8

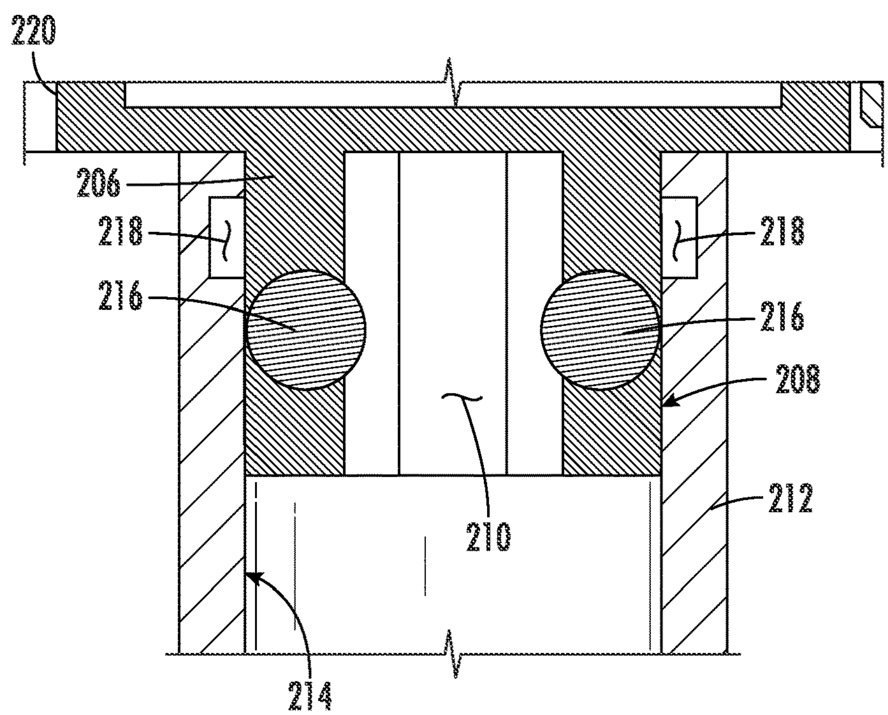
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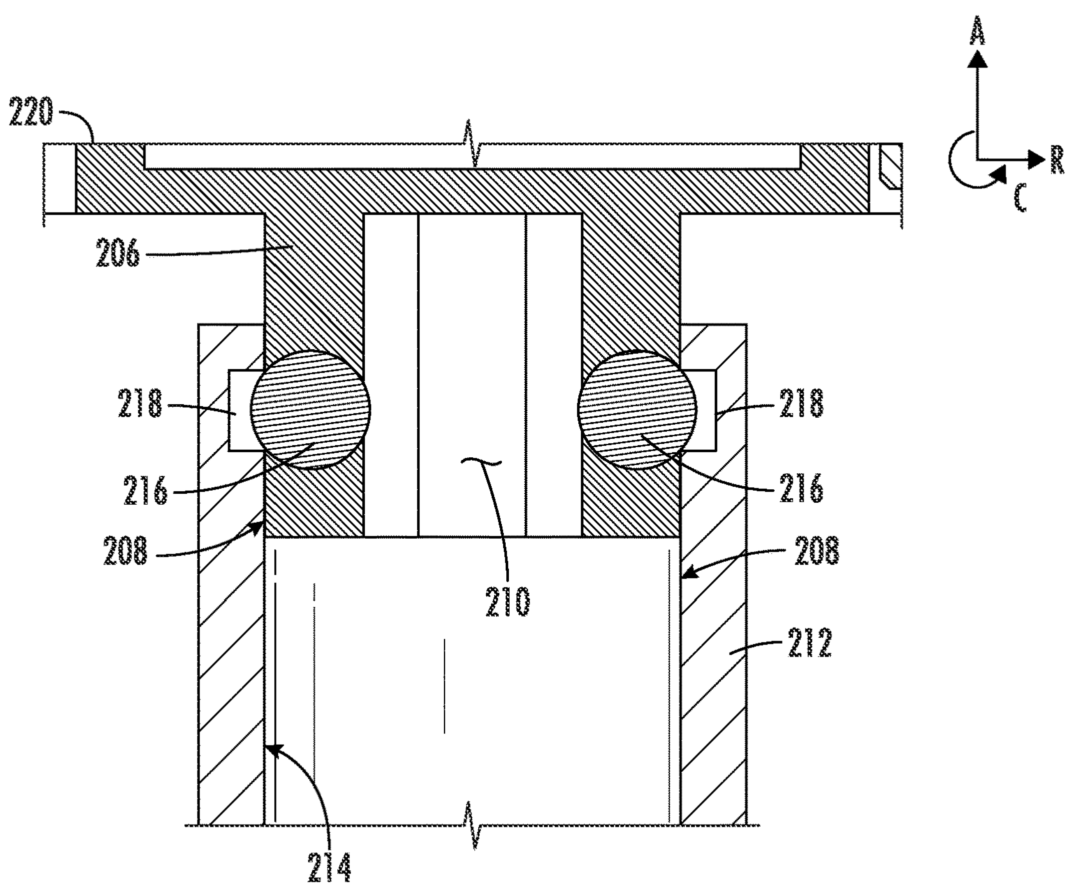
FIG. 9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212
214

FIG. 10

KITCHEN STAND MIXER AND SHAFT HEIGHT ADJUSTMENT MECHANISM FOR A KITCHEN STAND MIXER

FIELD OF THE INVENTION

[0001] The present subject matter relates generally to domestic appliances, and more particularly to shaft adjustment assemblies for stand mixers.

BACKGROUND OF THE INVENTION

[0002] Stand mixers are generally used for performing automated mixing, churning, or kneading involved in food preparation. Typically, stand mixers include a motor configured to provide torque to one or more driveshafts. Users may connect various utensils to the one or more driveshafts, including whisks, spatulas, or the like. In performing operations, multiple different utensils may be frequently switched. Each utensil may be a different height, resulting in different depth to which each utensil may extend within a bowl, for example.

[0003] Existing mixers exhibit certain drawbacks. For instance, adjusting a height (or depth) of a particular utensil is cumbersome and time consuming. Additional accessories or manipulation of the mixer can be required in order to achieve a desired depth of the utensil.

[0004] Accordingly, a stand mixer that obviates one or more of the above-mentioned drawbacks would be beneficial. In particular, a shaft adjustment assembly for a stand mixer capable of fine tuning would be useful.

BRIEF DESCRIPTION OF THE INVENTION

[0005] Aspects and advantages of the invention will be set forth in part in the following description, or may be obvious from the description, or may be learned through practice of the invention.

[0006] In one exemplary aspect of the present disclosure, a stand mixer is provided. The stand mixer may include a casing including a base, a column extending from the base, and a motor housing connected to the column; a motor assembly provided within the motor housing, the motor assembly including a motor shaft; a drive shaft operably coupled with the motor shaft and configured to receive a rotational input from the motor shaft; and a shaft adjustment assembly provided at a distal end of the drive shaft, the shaft adjustment assembly defining an axial direction, a radial direction, and a circumferential direction. The shaft adjustment assembly may include an output shaft adjustably coupled to the drive shaft along the axial direction and configured to receive a rotational input from the drive shaft, the output shaft including a chuck protrusion extending therefrom, the chuck protrusion being configured to receive one or more accessories; a clutch cover positioned around the output shaft along the circumferential direction, the clutch cover being movable along the axial direction between a first position and a second position; at least one clutch pin operably coupled with the clutch cover, the at least one clutch pin selectively penetrating each of the drive shaft and the output shaft along the axial direction; a chuck sleeve positioned around the chuck protrusion, the chuck sleeve being movable along the axial direction with respect to the chuck protrusion; and a catch received within the chuck protrusion, the catch being movable along the radial direction between an engaged position and a recessed position.

[0007] In another exemplary aspect of the present disclosure, a shaft adjustment assembly for a domestic appliance is provided. The domestic appliance may include a drive shaft, the shaft adjustment assembly being provided at a distal end of the drive shaft, the shaft adjustment assembly defining an axial direction, a radial direction, and a circumferential direction. The shaft adjustment assembly may include an output shaft adjustably coupled to the drive shaft along the axial direction and configured to receive a rotational input from the drive shaft, the output shaft including a chuck protrusion extending therefrom, the chuck protrusion being configured to receive one or more accessories; a clutch cover positioned around the output shaft along the circumferential direction, the clutch cover being movable along the axial direction between a first position and a second position; at least one clutch pin operably coupled with the clutch cover, the at least one clutch pin selectively penetrating each of the drive shaft and the output shaft along the axial direction; a chuck sleeve positioned around the chuck protrusion, the chuck sleeve being movable along the axial direction with respect to the chuck protrusion; and a catch received within the chuck protrusion, the catch being movable along the radial direction between an engaged position and a recessed position.

[0008] These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] A full and enabling disclosure of the present invention, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures.

[0010] FIG. **1** provides a side section view of a stand mixer according to an exemplary embodiment of the present disclosure.

[0011] FIG. **2** provides a perspective close up view of a shaft adjustment assembly of the stand mixer of FIG. **1** according to exemplary embodiments of the disclosure.

[0012] FIG. **3** provides a cross-section view of the exemplary shaft adjustment assembly of FIG. **2**.

[0013] FIG. **4** provides a closeup cross-section view of the exemplary shaft adjustment assembly of FIG. **2** with a clutch cover in a first position.

[0014] FIG. **5** provides a closeup cross-section view of the exemplary shaft adjustment assembly of FIG. **2** with the clutch cover in a second position.

[0015] FIG. **6** provides a perspective view of an interior of the exemplary shaft adjustment assembly of FIG. **2**.

[0016] FIG. **7** provides a perspective cross-section view of the exemplary shaft adjustment assembly of FIG. **2** with the clutch cover in the second position.

[0017] FIG. **8** provides a partial perspective cross-section view of the exemplary shaft adjustment assembly of FIG. **2** with the clutch cover in the second position.

[0018] FIG. **9** provides a closeup cross-section view of a sleeve of the exemplary shaft adjustment assembly of FIG. **2** in a locked position.

[0019] FIG. **10** provides a closeup cross-section view of the sleeve of the exemplary shaft adjustment assembly of FIG. **2** in an unlocked position.

[0020] Repeat use of reference characters in the present specification and drawings is intended to represent the same or analogous features or elements of the present invention.

DETAILED DESCRIPTION

[0021] Reference now will be made in detail to embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope of the invention. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

[0022] As used herein, the terms "first," "second," and "third" may be used interchangeably to distinguish one component from another and are not intended to signify location or importance of the individual components. The terms "includes" and "including" are intended to be inclusive in a manner similar to the term "comprising." Similarly, the term "or" is generally intended to be inclusive (i.e., "A or B" is intended to mean "A or B or both"). In addition, here and throughout the specification and claims, range limitations may be combined and/or interchanged. Such ranges are identified and include all the sub-ranges contained therein unless context or language indicates otherwise. For example, all ranges disclosed herein are inclusive of the endpoints, and the endpoints are independently combinable with each other. The singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise.

[0023] Approximating language, as used herein throughout the specification and claims, may be applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related. Accordingly, a value modified by a term or terms, such as "generally," "about," "approximately," and "substantially," are not to be limited to the precise value specified. In at least some instances, the approximating language may correspond to the precision of an instrument for measuring the value, or the precision of the methods or machines for constructing or manufacturing the components and/or systems. For example, the approximating language may refer to being within a 10 percent margin, i.e., including values within ten percent greater or less than the stated value. In this regard, for example, when used in the context of an angle or direction, such terms include within ten degrees greater or less than the stated angle or direction, e.g., "generally vertical" includes forming an angle of up to ten degrees in any direction, e.g., clockwise or counterclockwise, with the vertical direction V.

[0024] The word "exemplary" is used herein to mean "serving as an example, instance, or illustration." In addition, references to "an embodiment" or "one embodiment" does not necessarily refer to the same embodiment, although it may. Any implementation described herein as "exemplary" or "an embodiment" is not necessarily to be construed as preferred or advantageous over other implementations. Moreover, each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope of the invention. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

[0025] FIG. **1** provides a side view of a stand mixer **100** according to an exemplary embodiment of the present subject matter. It will be understood that stand mixer **100** is provided by way of example only and that the present subject matter may be used in or with any suitable stand mixer in alternative example embodiments. Moreover, with reference to FIG. **1**, stand mixer **100** defines a vertical direction V, a lateral direction L, and a transverse direction T. It should be understood that these directions are presented for exemplary purposes only, and that relative positions and locations of certain aspects of stand mixer **100** may vary according to specific embodiments, spatial placement, or the like.

[0026] Stand mixer **100** may include a casing **101**. In detail, casing **101** may include a motor housing **102**, a base **104**, and a column **106**. Motor housing **102** may house various mechanical and/or electrical components of stand mixer **100**. For example, as shown in FIG. **1**, a motor **112**, a planetary gearbox (or reduction gearbox) **114**, and a bevel gear box **116** may be disposed within motor housing **102**. Base **104** may support motor housing **102**. For example, motor housing **102** may be mounted (e.g., pivotally) to base **104** via column **106**, e.g., that extends upwardly (e.g., along the vertical direction V). Motor housing **102** may be suspended over a mixing zone **105**, within which a mixing bowl may be disposed.

[0027] A drivetrain **110** may be provided within motor housing **102** and is configured for coupling motor **112** to a shaft **109** (e.g., a mixer shaft or drive shaft), such that shaft **109** is rotatable via motor **112** through drivetrain **110**. Drivetrain **110** may include planetary gearbox **114**, bevel gearbox **116**, etc. Drive shaft **109** may be positioned above mixing zone **105** on motor housing **102**, and an attachment **108**, such as a beater, whisk, or hook, may be removably mounted to drive shaft **109**. Attachment **108** may rotate within a bowl (not shown) in mixing zone **105** to beat, whisk, knead, etc. material within the bowl, during operation of motor **112**.

[0028] As noted above, motor **112** may be operable to rotate drive shaft **109**. For instance, a motor shaft **113** may connect motor **112** to drive shaft **109** (e.g., through planetary gearbox **114**, bevel gearbox **116**, etc.). Motor **112** may be a direct current (DC) motor in certain example embodiments. In alternative example embodiments, motor **112** may be an alternating current (AC) motor. Motor **112** may include a rotor and a stator. The stator may be mounted within motor housing **102** such that the stator is fixed relative to motor housing **102**. A current through windings within the stator may generate a magnetic field that induces rotation of the rotor, e.g., due to magnets or a magnetic field via coils on the stator. The rotor may rotate at a relatively high rotational velocity and relatively low torque. Thus, drivetrain **110** may be configured to provide a rotational speed reduction and mechanical advantage between motor **112** and drive shaft **109**.

[0029] Stand mixer **100** may include a shaft adjustment assembly **200**. Shaft adjustment assembly **200** may be provided at a distal end of drive shaft **109**. For instance, shaft adjustment assembly **200** may be operably connected with drive shaft **109**. Shaft adjustment assembly **200** may be configured to provide height adjustments (e.g., along the vertical direction V) to attachment **108**. For instance, shaft adjustment assembly **200** may allow for incremental height adjustments of attachment **108** relative to drive shaft **109**. Shaft adjustment assembly **200** may define an axial direction A, a radial direction R, and a transverse direction T. According to some embodiments, axial direction A may be parallel with vertical direction V of stand mixer **100**.

[0030] Referring briefly to FIGS. **5** and **8**, a distal end **118** of drive shaft **109** is shown. Drive shaft **109** may be adjustably coupled to shaft adjustment assembly **200**, as will be described. Drive shaft **109** may include a drive flange **120**. Drive flange **120** may protrude from distal end **118** of drive shaft **109** along the radial direction R. For instance, drive shaft **109** may include an outer circumferential surface **122**. Drive flange **120** may extend along the circumferential direction C, about drive shaft **109** along outer circumferential surface **122**. Accordingly, drive flange **120** may include a top surface **124** (e.g., facing upward along the axial direction A) and a bottom surface **126** opposite top surface **124** (e.g., facing downward along the axial direction A). Additionally or alternatively, outer circumferential surface **122** of drive shaft **109** may be threaded. According to some embodiments, drive flange **120** is positioned above the threaded portion of drive shaft **109** (e.g., along the axial direction A).

[0031] At least one drive pin hole **128** may be formed through drive flange **120**. In detail, a set of drive pin holes **128** may be defined through drive flange **120** along the axial direction A. Each of the set of drive pin holes **128** may extend through drive flange **120** from top surface **124** to bottom surface **126**. Accordingly, drive pin holes **128** may be through holes. According to some embodiments, however, drive pin holes **128** may be blind holes. For instance, drive pin holes **128** may extend upward along the axial direction from bottom surface **126** to a blind portion within drive flange **120**. Any suitable number of drive pin holes **128** may be provided through drive flange **120**, such as 4 drive pin holes, 6 drive pin holes, 8 drive pin holes, or the like. Moreover, the set of drive pin holes **128** may be spaced equidistant from each other along the circumferential direction C about drive flange **120**. As will be described in more detail below, drive pin holes **128** may be configured to selectively receive clutch pins therein.

[0032] Referring now to FIGS. **2** through **10**, shaft adjustment assembly **200** will be described in detail. Shaft adjustment assembly **200** may include an output shaft **202**. Output shaft **202** may be operably connected with drive shaft **109**. For instance, output shaft **202** may be threadedly coupled with drive shaft **109** (FIG. **3**). Accordingly, output shaft **202** may be adjusted with respect to drive shaft **109** along the axial direction A by rotating about drive shaft **109**. Output shaft **202** may be in threaded attachment with outer circumferential surface **122** of drive shaft **109**. For instance, output shaft **202** may include an inner circumferential surface **204**. Inner circumferential surface **204** may be threaded (e.g., complementary to outer circumferential surface **122** of drive shaft **109**). Thus, output shaft **202** may be threaded onto drive shaft **109**. However, according to some embodiments, output shaft **109** is in threaded attachment with an inner circumferential surface of drive shaft **109**, as one of ordinary skill in the art would understand.

[0033] Output shaft **202** may thus receive a rotational input from drive shaft **109**. In detail, as motor **112** provides rotational energy to motor shaft **113**, the rotational energy may be transferred (e.g., through gearboxes **114**, **116**) to drive shaft **109**. Drive shaft **109** may then rotate (e.g., about the circumferential direction C). As output shaft **202** is in threaded attachment with drive shaft **109** along the axial direction A, output shaft **202** may also rotate, in turn providing a rotational output to attachment **108** (e.g., within a mixing bowl). As mentioned above, motor **112** may be a bi-directional motor. Accordingly, each of drive shaft **109** and output shaft **202** may be configured to rotate in either a clockwise direction or a counterclockwise direction. As will be described, shaft adjustment assembly **200** may restrict output shaft **202** from unthreading from drive shaft **109**.

[0034] Output shaft **202** may include a chuck protrusion **206**. Chuck protrusion **206** may extend from a distal end of output shaft **202** (e.g., along the axial direction A). Thus, chuck protrusion **206** may extend away from drive shaft **109**. Chuck protrusion **206** may be configured to receive one or more accessories (e.g., attachment **108**, described above). Output shaft **202** (e.g., at chuck protrusion **206**) may include an outer circumferential surface **208**. Outer circumferential surface **208** may be predominantly cylindrical along the axial direction A. Moreover, chuck protrusion **206** may define an accessory receiving cavity **210**. Accessory receiving cavity **210** may be a hexagonal cavity, for instance. However, it should be understood that receiving cavity **210** may have any suitable shape to accommodate a variety of accessories or attachments.

[0035] Shaft adjustment assembly **200** may include a chuck sleeve **212**. Chuck sleeve **212** may be provided around chuck protrusion **206** (e.g., along the circumferential direction C). Chuck sleeve **212** may be movably coupled to chuck protrusion **206**. For instance, chuck sleeve **212** may be in sliding contact (e.g., along the axial direction A) with outer circumferential surface **208** of chuck protrusion **206**. Chuck sleeve **212** may include an inner circumferential surface **214**. Accordingly, inner circumferential surface **214** may be in sliding contact with outer circumferential surface **208** of chuck protrusion **206**. Chuck sleeve **212** may be slidable between a locked position (FIG. **9**) and an unlocked position (FIG. **10**). For instance, the locked position may refer to a position during which accessory **108** is attached to chuck protrusion **206**. Accordingly, the unlocked position may refer to a position during which accessory **108** is released from chuck protrusion **206**.

[0036] Referring briefly to FIGS. **9** and **10**, chuck protrusion **206** may include a catch **216**. In detail, a set of catches **216** may be provided within chuck protrusion **206**. Hereinafter, a description of a single catch **216** will be provided in detail with the understanding that the description applies to two or more catches that may be incorporated into specific embodiments. Catch **216** may be a ball (e.g., a sphere) positioned within a groove formed within chuck protrusion **206**. For instance, the groove may be formed through chuck protrusion **206** along the radial direction R. Catch **216** may be movable within chuck protrusion **206** (e.g., within the groove) along the radial direction between an engaged position (FIG. **9**) and a recessed position (FIG. **10**). Catch **216** may be restrained within the groove such that only a predetermined portion of catch **216** is able to protrude from chuck protrusion **206**.

[0037] In the engaged position, at least a portion of catch **216** may protrude into receiving cavity **210** (e.g., along the radial direction R). When catch **216** is in the engaged position, the portion thereof within receiving cavity **210** may be received within a groove formed, for example, within accessory **108**. Accordingly, accessory **108** may be locked into place within receiving cavity **210**. When catch **216** is in the recessed position, no portion thereof is located within receiving cavity **210**. Accessory **108** may then be removed from receiving cavity **210** (e.g., along the axial direction A).

[0038] Chuck sleeve **212** may include a groove **218**. Groove **218** may be formed into inner circumferential surface **214** (e.g., along the radial direction R). As mentioned above, chuck sleeve **212** may be slidable between the locked position and the unlocked position. When chuck sleeve is in the unlocked position (FIG. **10**), at least a portion of catch **216** may be received within groove **218** (e.g., along the radial direction R). For instance, as chuck sleeve **212** is moved (e.g., downward along the axial direction A), groove **218** becomes aligned with catch **216** along the radial direction R. Catch **216** may then move along the radial direction from receiving cavity **210** toward groove **218**.

[0039] Referring back to FIGS. **2** through **8**, output shaft **202** may include an output flange **220**. Output flange **220** may protrude from a proximal end of output shaft **202** along the radial direction R. For instance, output shaft **202** may include outer circumferential surface **208**. Output flange **220** may extend along the circumferential direction C, about output shaft **202** along outer circumferential surface **208**. Accordingly, output flange **220** may include a top surface **224** (e.g., facing upward along the axial direction A) and a bottom surface **226** opposite top surface **224** (e.g., facing downward along the axial direction A). Additionally or alternatively, inner circumferential surface **204** of output shaft **202** may be threaded. According to some embodiments, output flange **220** is positioned above chuck protrusion **206** (e.g., along the axial direction A).

[0040] Output flange **220** may include a trench **221**. Trench **221** may be formed through top surface **224** of output flange **220** (e.g., along the axial direction A). Trench **221** may have any suitable depth. For instance, trench **221** may be a blind hole formed into top surface **224**. Any suitable number of trenches **221** may be formed. According to some embodiments, a plurality of trenches **221** are provided. Each of the plurality of trenches **221** may be spaced equidistant from each other about the circumferential direction C.

[0041] At least one output pin hole **228** may be formed through output flange **220**. In detail, a set of output pin holes **228** may be defined through output flange **220** along the axial direction A. Each of the set of output pin holes **228** may extend through output flange **220** from top surface **224** to bottom surface **226**. Accordingly, output pin holes **228** may be through holes. According to some embodiments, however, output pin holes **228** may be blind holes. For instance, output pin holes **228** may extend downward along the axial direction A from top surface **226** to a blind portion within output flange **220**. Any suitable number of output pin holes **228** may be provided through output flange **220**, such as **4** output pin holes, **6** output pin holes, **8** output pin holes, or the like. For instance, the number of output pin holes **228** may be equal to the number of drive pin holes **128**. Moreover, the set of output pin holes **228** may be spaced equidistant from each other along the circumferential direction C about output flange **220**. As will be described in more detail below, output pin holes **228** may be configured to receive clutch pins therein.

[0042] Shaft adjustment assembly **200** may include a clutch cover **230**. Clutch cover **230** may be positioned around output shaft **202** (e.g., along the circumferential direction C). Clutch cover **230** may be generally cylindrically shaped and may include or define an inner circumferential face **232** and an outer circumferential face **234** opposite inner circumferential face **232**. For instance, inner circumferential face **232** may be in contact with output shaft **202** (e.g., at output flange **220**). Clutch cover **230** may be movable along the axial direction A. According to at least some embodiments, clutch cover **230** is movable between a first position (FIG. **4**) and a second position (FIG. **5**). Accordingly, inner circumferential face **232** may be in sliding contact with output flange **220**.

[0043] Clutch cover **230** may include an inner flange **236**. Inner flange **236** may protrude inward (e.g., along the radial direction R) from inner circumferential face **232**. For instance, inner flange **236** may be positioned between output flange **220** and drive flange **120** (e.g., along the axial direction A). Inner flange **236** may extend along the circumferential direction C. A gap may be formed between a distal edge of inner flange **236** and output shaft **202**. However, in some instances, inner flange **236** may contact outer circumferential surface **208** of output shaft **202**. Additionally or alternatively, inner flange **236** may be positioned at or near a top of clutch cover **230** (e.g., along the axial direction A).

[0044] Inner flange **236** may include a boss **237**. Boss **237** may protrude downward (e.g., along the axial direction A) from a bottom surface of inner flange **236**. According to some embodiments, a plurality of bosses **237** are provided. Each of the plurality of bosses **237** may be spaced equidistant from each other about the circumferential direction C. Boss **237** may be selectively received within trench **221** in output flange **220** (e.g., when clutch cover **230** is moved to the second position).

[0045] Clutch cover **230** may include an outer flange **238**. Outer flange **238** may protrude outward (e.g., along the radial direction R) from outer circumferential face **234**. Outer flange **238** may be provided at a bottom of clutch cover **230** (e.g., along the axial direction A). Outer flange **238** may extend along the circumferential direction C. For instance, outer flange **238** may provide a lip, handle, ledge, or otherwise contact point for a user to move clutch cover **230** from the first position (FIG. **4**) to the second position (FIG. **5**).

[0046] At least one clutch pin hole **240** may be formed through inner flange **236**. In detail, a set of clutch pin holes **240** may be defined through inner flange **236** along the axial direction A. Each of the set of clutch pin holes **240** may extend through inner flange **236** from a top surface to a bottom surface thereof. Accordingly, clutch pin holes **240** may be through holes. Any suitable number of clutch pin holes **240** may be provided through inner flange **236**, such as 4 clutch pin holes, 6 clutch pin holes, 8 clutch pin holes, or the like. For instance, the number of clutch pin holes **240** may be equal to the number of drive pin holes **128** and output pin holes **228**. Moreover, the set of clutch pin holes **240** may be spaced equidistant from each other along the circumferential direction C about inner flange **236**. Clutch pin hole **240** may define a diameter D**1**. As will be described in more detail below, clutch pin holes **240** may be configured to receive clutch pins therein.

[0047] Shaft adjustment assembly **200** may include a clutch pin **242**. In detail, a set of clutch pins **242** may be provided. Any suitable number of clutch pins **242** may be provided, such as 4 clutch pins, 6 clutch pins, 8 clutch pins, or the like. For instance, the number of clutch pins **242** may be equal to the number of drive pin holes **128**, output pin holes **228**, and clutch pin holes **240**. Hereinafter, a description of a single clutch pin **242** will be described with the understanding that the description applies to two or more clutch pins **242** that may be incorporated into specific embodiments.

[0048] Clutch pin **242** may be a cylindrical body. Clutch pin **242** may be operably coupled with clutch cover **230**. For instance, clutch pin **242** may penetrate inner flange **236** (e.g., through clutch pin hole **240**). Additionally or alternatively, clutch pin **242** may penetrate output flange **220** (e.g., through output pin hole **228**). Further still, clutch pin **242** may selectively penetrate drive flange **120** (e.g., through drive pin hole **128**).

[0049] Clutch pin **242** may include a pin flange **244**. Pin flange **244** may protrude from clutch pin **242** along the radial direction R. Moreover, pin flange **244** may extend along the circumferential direction C. Pin flange **244** may define a diameter D**2**. Diameter D**2** of pin flange **244** may be greater than diameter D**1** of clutch pin hole **240**. Additionally or alternatively, pin flange **244** may be positioned between inner flange **236** of clutch cover **230** and output flange **220** (e.g., along the axial direction A). Accordingly, when clutch cover **230** moves from the first position to the second position, clutch pin **242** is pushed downward (along the axial direction A) by inner flange **236** pushing on pin flange **244**.

[0050] As can be seen in FIG. **5**, a top portion of clutch pin **242** may be withdrawn from drive pin hole **128** when clutch cover **230** is in the second position. When clutch pin **242** is withdrawn from drive pin hole **128**, output shaft **202** may be rotated (e.g., via the threads) with respect to drive shaft **109**. Advantageously, this may allow for fine height adjustment (e.g., along the axial direction A) of output shaft **202**. As would be understood, when clutch pin **242** is reinserted into drive pin hole **128** (e.g., when clutch cover **230** is returned to the first position), output shaft **202** may be restricted from rotating with respect to drive shaft **109**.

[0051] Shaft adjustment assembly **200** may include a resilient member **250**. In detail, a set of resilient members **250** may be provided. Any suitable number of resilient members **250** may be provided, such as 4 resilient members, 6 resilient members, 8 resilient members, or the like. For instance, the number of resilient members **250** may be equal to the number of clutch pins **242**, drive pin holes **128**, output pin holes **228**, and clutch pin holes **240**. Hereinafter, a description of a single resilient member **250** will be described with the understanding that the description applies to two or more resilient members **250** that may be incorporated into specific embodiments.

[0052] Resilient member **250** may be a spring. For instance, resilient member **250** may be a coil spring positioned around clutch pin **242**. Resilient member **150** may be positioned between pin flange **244** and top surface **224** of output flange **220**. Resilient member **250** may bias clutch pin **242** along the axial direction A. For instance, resilient member **250** may bias clutch pin **242** toward drive shaft **109**. Thus, when clutch cover **230** is in the first position (FIG. **4**), resilient member **250** biases clutch pin **242** into drive pin hole **128**.

[0053] According to the embodiments described herein, accessories for a stand mixer may be fine adjusted along the axial direction through a clutch mechanism. One or more pins may penetrate each of a drive shaft and an output shaft to restrict rotational movement of each relative to each other. When the clutch mechanism is moved from a locked (or first) position to an unlocked (or second) position, the one or more pins are withdrawn from the drive shaft, allowing the output shaft to rotate with respect to the drive shaft. By way of a threaded attachment, the output shaft may thus raise or lower by small increments. Returning the clutch mechanism to the first position (after aligning the one or more pins with corresponding receiving holes) locks the output shaft relative to the drive shaft, allowing rotational energy to be exchanged between the two.

[0054] This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they include structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

What is claimed is:

1. A stand mixer comprising:

a casing comprising a base, a column extending from the base, and a motor housing connected to the column;

a motor assembly provided within the motor housing, the motor assembly comprising a motor shaft;

a drive shaft operably coupled with the motor shaft and configured to receive a rotational input from the motor shaft; and

a shaft adjustment assembly provided at a distal end of the drive shaft, the shaft adjustment assembly defining an axial direction, a radial direction, and a circumferential direction, the shaft adjustment assembly comprising:

an output shaft adjustably coupled to the drive shaft along the axial direction and configured to receive a rotational input from the drive shaft, the output shaft comprising a chuck protrusion extending therefrom, the chuck protrusion being configured to receive one or more accessories;

a clutch cover positioned around the output shaft along the circumferential direction, the clutch cover being movable along the axial direction between a first position and a second position;

at least one clutch pin operably coupled with the clutch cover, the at least one clutch pin selectively penetrating each of the drive shaft and the output shaft along the axial direction;

a chuck sleeve positioned around the chuck protrusion, the chuck sleeve being movable along the axial direction with respect to the chuck protrusion; and

a catch received within the chuck protrusion, the catch being movable along the radial direction between an engaged position and a recessed position.

2. The stand mixer of claim **1**, wherein the drive shaft comprises a drive flange protruding along the radial direction therefrom and extending along the circumferential direction, the drive flange comprising at least one drive pin hole defined therethrough along the axial direction.

3. The stand mixer of claim **1**, wherein the output shaft comprises an output flange protruding along the radial direction therefrom and extending along the circumferential direction, the output flange comprising at least one output pin hole defined therethrough along the axial direction.

4. The stand mixer of claim **3**, wherein the output shaft is in threaded attachment with the drive shaft.

5. The stand mixer of claim **3**, wherein the clutch cover comprises:

an inner flange protruding inward along the radial direction from an inner circumferential face of the clutch cover and extending along the circumferential direction; and

an outer flange protruding outward along the radial direction from an outer circumferential face of the clutch cover and extending along the circumferential direction.

6. The stand mixer of claim **5**, wherein the clutch cover further comprises at least one clutch pin hole defined through the inner flange along the axial direction.

7. The stand mixer of claim **6**, wherein the at least one clutch pin comprises a pin flange protruding along the radial direction therefrom and extending along the circumferential direction, wherein a diameter of the pin flange is greater than a diameter of the clutch pin hole defined through the inner flange of the clutch cover.

8. The stand mixer of claim **7**, further comprising:

a resilient member positioned between the pin flange and the output flange along the axial direction, the resilient member biasing the at least one clutch pin along the axial direction toward the drive shaft.

9. The stand mixer of claim **1**, wherein the chuck sleeve is slidable along the axial direction between a locked position and an unlocked position.

10. The stand mixer of claim **9**, wherein the chuck sleeve comprises a cavity formed into an inner circumferential surface thereof, the cavity configured to selectively receive the catch therein when the catch is in the recessed position and the chuck sleeve is in the unlocked position.

11. A shaft adjustment assembly for a domestic appliance, the domestic appliance comprising a drive shaft, the shaft adjustment assembly being provided at a distal end of the drive shaft, the shaft adjustment assembly defining an axial direction, a radial direction, and a circumferential direction, the shaft adjustment assembly comprising:

an output shaft adjustably coupled to the drive shaft along the axial direction and configured to receive a rotational input from the drive shaft, the output shaft comprising a chuck protrusion extending therefrom, the chuck protrusion being configured to receive one or more accessories;

a clutch cover positioned around the output shaft along the circumferential direction, the clutch cover being movable along the axial direction between a first position and a second position;

at least one clutch pin operably coupled with the clutch cover, the at least one clutch pin selectively penetrating each of the drive shaft and the output shaft along the axial direction;

a chuck sleeve positioned around the chuck protrusion, the chuck sleeve being movable along the axial direction with respect to the chuck protrusion; and

a catch received within the chuck protrusion, the catch being movable along the radial direction between an engaged position and a recessed position.

12. The shaft adjustment assembly of claim **11**, wherein the drive shaft comprises a drive flange protruding along the radial direction therefrom and extending along the circumferential direction, the drive flange comprising at least one drive pin hole defined therethrough along the axial direction.

13. The shaft adjustment assembly of claim **11**, wherein the output shaft comprises an output flange protruding along the radial direction therefrom and extending along the circumferential direction, the output flange comprising at least one output pin hole defined therethrough along the axial direction.

14. The shaft adjustment assembly of claim **13**, wherein the output shaft is in threaded attachment with the drive shaft.

15. The shaft adjustment assembly of claim **13**, wherein the clutch cover comprises:

an inner flange protruding inward along the radial direction from an inner circumferential face of the clutch cover and extending along the circumferential direction; and

an outer flange protruding outward along the radial direction from an outer circumferential face of the clutch cover and extending along the circumferential direction.

16. The shaft adjustment assembly of claim **15**, wherein the clutch cover further comprises at least one clutch pin hole defined through the inner flange along the axial direction.

17. The shaft adjustment assembly of claim **16**, wherein the at least one clutch pin comprises a pin flange protruding along the radial direction therefrom and extending along the circumferential direction, wherein a diameter of the pin flange is greater than a diameter of the clutch pin hole defined through the inner flange of the clutch cover.

18. The shaft adjustment assembly of claim **17**, further comprising:

a resilient member positioned between the pin flange and the output flange along the axial direction, the resilient member biasing the at least one clutch pin along the axial direction toward the drive shaft.

19. The shaft adjustment assembly of claim **11**, wherein the chuck sleeve is slidable along the axial direction between a locked position and an unlocked position.

20. The shaft adjustment assembly of claim **19**, wherein the chuck sleeve comprises a cavity formed into an inner circumferential surface thereof, the cavity configured to selectively receive the catch therein when the catch is in the recessed position and the chuck sleeve is in the unlocked position.

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