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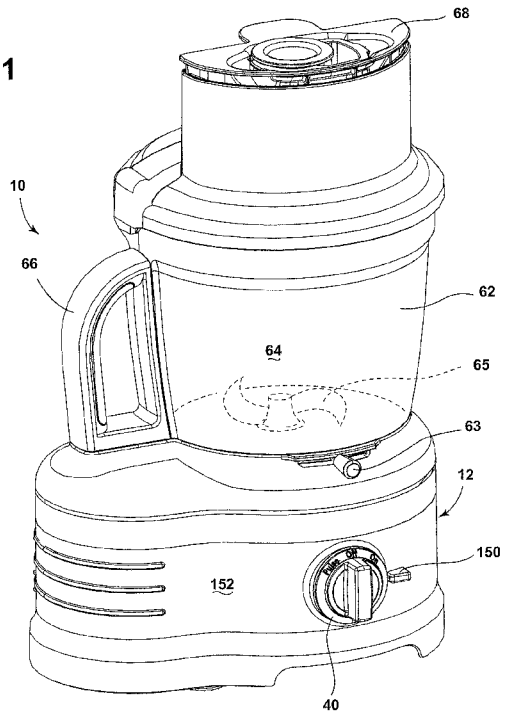
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[Continued on next page]

(54) **Title**: MULTIPLE-SPEED FOOD PROCESSING DEVICE

FIG. 1



(57) **Abstract**: A multiple-speed food processing device (10) includes a drive assembly (12), a primary idler shaft (14), a secondary idler shaft (22), a gear shift assembly (28) and a control (40). The primary idler shaft (14) includes first and second drive gears (16, 18). The gear shift assembly (28) includes a shifting gear (30) disposed between first and second drive gears (16, 18). The gear shift assembly (28) is moveable to a first position (32). The first drive gear (16) is engaged with the drive assembly (12) such that the primary idler shaft (14) rotates at a first rate of rotation. The gear shift assembly (28) is moveable to a second position (34). The second drive gear (18) is engaged with the drive assembly (12) by the secondary idler shaft (22) such that the primary idler shaft (14) rotates at a second rate of rotation. The control (40) is in communication with the shifting gear (30). The operation of the control (40) moves the shifting gear (30) between the first and second positions (32, 34).

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MULTIPLE-SPEED FOOD PROCESSING DEVICE

BACKGROUND

[0001] The device is in the field of electrical appliances for processing food items within a container.Specifically, an electrical food processing device having a speed-shifting mechanism.

SUMMARY

[0002] In one aspect,a multiple-speed food processing device includes a drive assembly. A primary idler shaft includes first and second drive gears and a secondary idler shaft. A gear shift assembly includes a shifting gear disposed between first and second drive gears. The gear shift assembly is moveable to a first position. The first drive gear is engaged with the drive assembly such that the primary idler shaft rotates at a first rate of rotation. The gear shift assembly is moveable to a second position. The second drive gear is engaged with the drive assembly by the secondary idler shaft such that the primary idler shaft rotates at a second rate of rotation. A control is in communication with the shifting gear. The operation of the control moves the shifting gear between the first and second positions.

[0003] In another aspect, a multiple-speed food processing device includes a drive assembly. A primary idler shaft includes first and second drive gears that are vertically translatable. A secondary idler shaft includes an input gear rotationally coupled to the drive assembly and an output gear. A gear shift assembly includes a shifting gear coupled with the primary idler shaft. The shifting gear is configured to vertically translate the first and second drive gears to a lowered position. The first drive gear is engaged directly with the drive assembly. The shifting gear is configured to vertically translate the first and second drive gears to a raised position. The second drive gear is engaged with the output gear of the secondary idler shaft such that the primary idler shaft rotates at a second rate of rotation. A control is in communication with the gear shift assembly. The control includes a gear slide configured to rotate the shifting gear, which results in vertical translation of the first and second drive gears between the lowered position and the raised position.

[0004] In yet another aspect, a multiple-speed food processing device includes a housing that has a drive assembly disposed therein and a primary idler shaft. A secondary idler shaft includes an input gear rotationally coupled to the drive assembly.

An output gear is selectively rotationally coupled to the primary idler shaft. A gear shift assembly includes a shifting gear in communication with the primary idler shaft. The shifting gear is configured to directly engage the primary idler shaft with the drive assembly such that the primary idler shaft rotates at a first rate of rotation, and also to directly engage the output gear of the secondary idler shaft with the primary idler shaft such that the primary idler shaft rotates at a second rate of rotation. A control is in communication with the gear shifting assembly.

[0005] These and other features, advantages, and objects of the present device will be further understood and appreciated by those skilled in the art by reference to the following specification, claims, and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the drawings:

[0007] FIG. 1 is a top perspective view of one embodiment of a food processing device of the present invention;

[0008] FIG. 2 is a side elevational view of the food processing device of FIG. 1 with the food processing jar removed;

[0009] FIG. 3 is a front perspective view of a drive assembly and a gear shift assembly of the food processing device of FIG. 1;

[0010] FIG. 4 is a rear perspective view of the gear shift assembly of FIG. 3;

[0011] FIG. 5 is a top perspective view of the gear shift assembly of FIG. 3;

[0012] FIG. 6 is a top exploded perspective view of the gear shift assembly of FIG. 3;

[0013] FIG. 7 is a front perspective view of a portion of the gear shift assembly of FIG. 3 in a lowered position.

[0014] FIG. 8 is a side perspective view of the gear shift assembly of FIG. 7 in the lowered position;

[0015] FIG. 9 is a rear perspective view of the gear shift assembly of FIG. 7 in the lowered position;

[0016] FIG. 10 is a top rear perspective view of the gear shift assembly of FIG. 7 in in the lowered position;

[0017] FIG. 11 is a side perspective view of the gear shift assembly of FIG. 3 in a raised position;

[0018] FIG. 12 is a side perspective view of the gear shift assembly of FIG. 11 in the raised position;

[0019] FIG. 13 is a rear perspective view of the gear shift assembly of FIG. 11 in the raised position; and

[0020] FIG. 14 is a top rear perspective view of the gear shift assembly of FIG. 11 in the raised position.

DETAILED DESCRIPTION

[0021] For purposes of description herein, the terms “upper,” “lower,” “right,” “left,” “rear,” “front,” “vertical,” “horizontal,” and derivatives thereof shall relate to the device as oriented in FIG. 1.However, it is to be understood that the device may assume various alternative orientations except for expressly specified to the contrary.It is also to be understood that the specific devices and processes illustrated in the attached drawings and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims.Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

[0022] As illustrated in FIGS. 1-14, reference numeral 10 generally refers tomultiple-speed food processing device having a drive assembly 12. A primary idler shaft 14 includes first and second drive gears 16, 18 that are vertically translatable. A secondary idler shaft 22 includes an input gear 24 rotationally coupled to the drive assembly 12 and an output gear 26. A gear shift assembly 28 includes a shifting gear30 coupled with the primary idler shaft 14. The shifting gear30 is configured to vertically translate the first and second drive gears 16, 18 to a lowered position 32, wherein the first drive gear 16 is engaged directly with the drive assembly 12. The shifting gear30 is also configured to vertically translate the first and second drive gears 16, 18 to a raised position 34, wherein the second drive gear 18 is engaged with the output gear 26 of the secondary idler shaft 22 such that the primary idler shaft 14 rotates at a second rate of rotation. A control 40 is in communication with the gear shift assembly 28. The control 40 includes a gear slide 42 configured to rotate the shifting gear 30, which results in vertical translation of the first and second drive gears 16, 18 between the lowered position 32 and the raised position 34.

[0023] As illustrated in the embodiment depicted in FIGS. 1 and 2, the multiple-speed food processing device 10 includes a housing 50 that contains the drive assembly 12. The drive assembly 12 includes asingle-speed motor 52 with a drive shaft 54 extending therefrom that is configured to rotate a relay gear 56 at a single speed about a primary vertical axis 57.The relay gear 56 is configured to rotate the primary idler shaft 14 at at least two output speeds. The gear shift assembly 28 is operable to translate the first and second drive gears 16, 18 to create the two output speeds of the primary idler shaft 14.The relationship between the primary idler shaft 14 and the gear shift assembly 28 will be describedherein.The primary idler shaft 14 is configured to rotate an output shaft 60 that extends from the housing 50 and into a food preparation zone 62 disposed above the housing 50, wherein various food items can be processed, as desired. As illustrated in FIG. 1, in one embodiment, the food preparation zone 62 is generally defined by a food processing jar 64 with a handle 66 and a lid 68. A blade control lever 63 extends from the housing 50 and is designed to rotate a blade adjustment gear 67 to adjust the relative height of blades 65 inside the housing 50.

[0024] The first and second drive gears 16, 18 of the primary idler shaft 14 are configured to vertically translate along the primary vertical axis57between the lowered position 32 (FIGS. 7-10) and the raised position 34 (FIGS. 11-14).The shifting gear 30 of the gear shift assembly 28 is disposed between the first and second drive gears 16, 18 and includesexternal shifting cogs 69. A mechanism 94 permits the shifting gear 30 to rotate about the primary vertical axis57 and simultaneously translate vertically along the primary vertical axis 57between the raised and lowered positions 34, 32.The mechanism94 includes a threaded interface, wherein the shifting gear 30 includes a first threaded portion disposed on an interior surface 76 of the shifting gear 30, and the primary idler shaft 14 includes a second threadedportion disposed proximate the first threaded portion, such that while the shifting gear 30 rotates about the primary idler shaft 14, the first and second threadedportions operate to translate the shifting gear 30 vertically into the raised and lowered positions 34, 32.Thus, the threaded interface is configured such that the first and second drive gears 16, 18 can translate vertically with the shifting gear30, and at the same time are free to rotate about the primary vertical axis 57independent of the shifting gear 30. This configuration allows one or both of the first and second drive gears 16, 18 to communicate with the relay gear 56 and also drive

the output shaft 60.The independent rotation of the first and second drive gears 16, 18 in relation to the shifting gear 30 can be accomplished through a bearing assembly, a rolling assembly, a gasket assembly, or other low-friction assembly that allows for substantially free rotational movement between the first and second drive gears 16, 18 and the shifting gear 30.It should be understood that the translation mechanism94 may include a variety of constructions.The translation mechanism94 can include, but is not limited to, a gear assembly, an assembly that includes opposing inclined surfaces, etc., that serve to vertically translate the shifting gear 30 and the primary idler shaft 14 in relation to the drive assembly 12.

[0025] Referring now to FIGS. 4 and 6-10, the first drive gear 16 is proximate the relay gear 56.A top surface of the relay gear 56 includes a crown-typecog interface 90 that is configured to engage a cooperating crown-typecog interface 92 disposed on a bottom surface of a primary idler gear 93 coupled to the primary idler shaft 14.In this manner, when the shifting gear 30 is rotated and translates to the first drive gear downward to the lowered position 32, the relay gear 56 directly engages the first drive gear 16 and rotates the first drive gear 16 about the primary vertical axis 57.The translation mechanism 94 extends vertically between the first and second drive gears 16, 18 and is held in place by a spring clip 95.In various embodiments, a low-friction rotation assembly, including a bearing 97 and a bearing washer 99, is part of the intermediate assembly and allows for smooth independent rotation of the first and second drive gears 16, 18 within the shifting gear 30.When the first and second drive gears16, 18 are in the lowered position 32, the translation mechanism 94, first and secondary drive gears16, 18, and output shaft 60 rotate at the same rotational rate as the relay gear 56 and drive shaft 54, which is coupled to the motor 52.

[0026] With reference again to FIGS. 5 and 6, the relay gear 56 includes relay cogs 100 that are disposed about aperiphery of the relay gear 56.The relay cogs 100 are configured to engage the input gear 24 of the secondary idler shaft 22.The secondary idler shaft 22 is disposed in a fixed position in relation to the drive assembly 12 and freely rotates about a secondary vertical axis 104.In this manner, the secondary idler shaft 22 is located such that the relay gear 56 is in continual operable communication with the input gear 24 of the secondary idler shaft 22 when the first and second drive gears 16, 18 are in both the raised and lowered positions 34, 32. Stated differently, the

secondary idler shaft 22 will be rotated by the relay gear 56, regardless of the positioning of the translational shifting gear 30 and the first and second drive gears 16, 18.

[0027] Referring again to the embodiment illustrated in FIGS. 5 and 6, the assembly discussed herein is generally supported between top and bottom plates 118, 119. A blade height assembly 121 extends upwardly from the top plate 118, and is operably coupled with the blade control lever 63. The secondary idler shaft 22 includes a connecting shaft 120 that extends between the input gear 24 and the output gear 26. The connecting shaft 120 rotates about the secondary vertical axis104.Bearing fasteners 123 fasten the output gear 26 and the input gear 24 to the connecting shaft 120. The input gear 24, the output gear 26, and the connecting shaft 120 are coupled such that the entire secondary idler shaft 22 rotates in unison when the relay gear 56 is engaged and the input gear 24 of the secondary idler shaft 22 is rotated.When the shifting gear 30 and the first and second drive gears 16, 18 are disposed in the lowered position 32, the output gear 26 of the secondary idler shaft 22 rotates freely and does not engage the second drive gear 18 or any other portion of the primary idler shaft 14.In this manner, when the shifting gear 30 is disposed in the lowered position 32, the secondary idler shaft 22 does not interfere with rotation of the primary idler shaft 14 and the output shaft 60 at the first rate of rotation, which is the same rate of rotation as the relay gear 56.

[0028] As illustrated in FIGS. 11-14, when the shifting gear 30 is translated upwards, and the first and second drive gears 16, 18 are placed in the raised position 34, the first drive gear 16 is disengaged from the relay gear 56.At the same time, the second drive gear 18, in the raised position 34, engages the output gear 26 of the secondary idler shaft 22.Accordingly, when the relay gear 56 rotates, the input gear 24 rotates along with the connecting shaft 120 and the output gear 26. Because the output gear 26 is in engagement with the second drive gear 18, rotation of the output gear 26 results in rotation of the second drive gear 18. The input gear 24 of the secondary idler shaft 22 has a greater diameter than the output gear 26 of the secondary idler shaft 22.In this manner, the output gear 26 rotates the second drive gear 18 at a second slower rotational rate than the rate in which the relay gear 56 rotates.Consequently, the output shaft 60 of the multiple-speed food processing device 10 rotates at the second slower

speed.In addition, the multiple-speed food processing device 10, while operating at the second slower speed, will have a greater torque force at the output shaft 60 than when the multiple-speed food processing device 10 operates at the faster first speed.

[0029] In alternate embodiments, the input gear 24 of the secondary idler shaft 22 can have a smaller diameter than the output gear 26 of the secondary idler shaft 22, such that when the shifting gear 30 and the first and second drive gears 16, 18 are disposed in the raised position 34, and the output gear 26 of the secondary idler shaft 22 engages the second drive gear 18, the second drive gear 18 will rotate at a faster rotational rate than the relay gear56, causing the output shaft 60 to rotate at a faster speed.

[0030] In other alternate embodiments, the multiple-speed food processing device 10 can include multiple secondary idler shafts 22, each secondary idler shaft 22 having a different gear ratio between the input gears 24 and output gears 26.In such an embodiment, the shifting gear 30 can be raised and lowered between multiple positions, wherein each position corresponds to an engagement between a predetermined drive gear of the primary idler shaft 14 and the output gear 26 of one of the multiple secondary idler shafts 22, such that a plurality of speeds can be achieved by the multiple-speed food processing device 10 while having a simple motor 52 that operates at a single speed.

[0031] In addition to the raised and lowered positions 34, 32 of the shifting gear 30 and the first and second drive gears 16, 18, the shifting gear 30 may include an intermediate idle position, wherein the primary idler shaft 14 is selectively disengaged from the drive assembly 12 and the secondary idler shaft 22.Such an intermediate idle position can allow the output shaft 60 of the multiple-speed food processing device 10 to temporarily stop rotating without disengaging the motor 52.

[0032] As shown in FIGS. 9, 10, 13, and 14, the drive assembly 12, the primary idler shaft 14, and the gear shift assembly 28 rotate about the primary vertical axis 57.The secondary idler shaft 22, which is disposed adjacent to the primary vertical axis 57, rotates about the secondary vertical axis 104, which is spaced from, but parallel to, the primary vertical axis 57.In various alternate embodiments, the secondary idler shaft 22 can rotate about the secondary vertical axis 104that is not parallel with the primary vertical axis 57.In such an embodiment, angled cogs can be disposed on the relay gear 56 or the input gear 24, or both, to accommodate the angled rotational axis.Such

embodiments may be implemented to account for varying locations and configurations of features and mechanical equipment disposed within the housing 50 of the multiple-speed food processing device 10.

[0033] As illustrated in FIGS. 4-14, the control 40 of the multiple-speed food processing device 10 is in communication with the gear shift assembly 28.In various embodiments, the control 40 can be in communication with the shifting gear 30, wherein the operation of the control 40 translates the shifting gear 30 between various positions.The control 40 includes a user interface that can include, but is not limited to, a knob, a dial, a lever, a push button interface, or a digital or electronic interface.The user interface includes a control gear 140 that is engaged with and operatesthe gear slide 42that is coupled to the control gear 140.In this manner, the control gear 140 and the gear slide 42cooperate to move the shifting gear 30 between the raised and lowered positions 34, 32.In various alternate embodiments, a linking gear 144 is disposed between the gear slide 42and the shifting gear 30, such that as the user operates the user interface, the control gear 140 actuates the gear slide 42and the gear slide 42 actuates the linking gear 144, wherein the linking gear 144 engages the shifting gear 30 to control the translational operation of the shifting gear 30 between the raised and lowered positions 34, 32.In other alternate embodiments, additional intermediary gears can be disposed within the control 40, depending upon the desired operation of the multiple-speed food processing device 10 and the electrical controls of the multiple-speed food processing device 10 contained within the housing 50.

[0034] With reference again to FIGS. 3, 6, 7, and 11, the control 40 includes a user interface having a knob 148 that is configured to control whether the drive assembly 12 is on, off, or pulsing. The control 40 also includes a speed control lever 150 that is rotated about a substantially horizontal axis, wherein the speed control lever 150 is located on an exterior surface 152 of the housing 50.The speed control lever 150 can include various indicia 154 capable of communicating to the user a speed setting or other appliance configuration that has been selected.As the speed control lever 150 is rotated, the control gear 140 is also rotated.The control gear 140 includes an arcuate member156 with cogs 158 disposed at an upper surface 160 of the arcuate member 156.The cogs 158 of the arcuate member156 engage gear slide cogs 162 disposed on a lower portion 168 of the gear slide 42.In this manner, the rotational engagement of the

control gear140 with the gear slide 42 forms a rack-and-pinion type connection, such that the rotation of the control gear 140 translates the gear slide 42 laterally in relation to the primary idler shaft 14.The lateral movement of the gear slide 42, in turn, engages the linking gear 144, wherein the linking gear 144 includes a wire bracket 170 configured to connect the gear slide 42 to the linking gear 144, while also allowing for the linear movement of the gear slide 42 and the simultaneous rotational movement of the linking gear 144 about a third vertical axis 172, wherein the third vertical axis 172 is parallel to the primary and secondary vertical axes 57, 104.The linking gear 144 includes a plurality of linking cogs 174 disposed on at least a portion of a circumference of the linking gear 144.The linking cogs 174 are configured to engage the shifting cogs 69 disposed on the outer surface of the shifting gear 30, such that as the linking gear 144 rotates about the third vertical axis 172, the linking cogs 174 engage the shifting cogs 69, such that the shifting gear 30 rotates about the primary vertical axis 57.The height of the shifting gear 30 is configured such that as the shifting gear 30 rotates about the primary vertical axis 57 and simultaneously translates vertically between the raised and lowered positions 34, 32, the shifting cogs 69 remain in engagement with the linking cogs 174 of the linking gear 144.

[0035] In operation, the multiple-speed food processing device 10 would be operated by a user by first plugging in a power cord of the multiple-speed food processing device 10 into a power outlet. Food items that are desired to be chopped are placed in the food processing jar 64 and the lid 68 is secured. The blade control lever 63 is adjusted to a desired height for dicing or chopping the food items. After the desired height of the blade control lever 63 has been selected and the lid 68 is secured, a user can then activate the drive assembly 12 by rotating the knob 148 to the on position or to the pulse position. Once the knob 148 has been moved to the on position or the pulse position, the speed control lever 150 can be adjusted to a desired rate of rotation of the blades 65 inside the food processing jar 64. When the speed control lever 150 is in the raised position 34, the first drive gear 16 is engaged with the primary idler shaft 14, such that the output shaft 60 rotates at a high rotational rate. When the speed control lever 150 is moved to the lowered position 32, the control gear 140 moves the gear slide 42laterally, which rotates the linking gear 144, which, in turn, rotates the shifting gear 30. As the shifting gear 30 rotates, the first drive gear 16 is disengaged from the primary

idler shaft 14, and the output gear 26, which is operably coupled with the secondary idler shaft 22, is engaged with the second drive gear 18. In this position, the rate of the output shaft 60 is lessened to a slower rotational rate. In one embodiment, the speed control lever 150 is locked out if the processor is in the "on" position. In this instance, a user must first set the desired speed setting before operating the multiple-speed food processing device 10 in the "on" or "pulse" settings.

[0036] In one embodiment, the multiple-speed food processing device 10 operates at 1,780 revolutions per minute, when operating in high-speed, and 890 revolutions per minute when operating in low-speed. When operating in the lower speed, the torque of the blades 65 is increased, which is optimum for certain food processing operations, such as slicing, shredding, coarse chopping, and cubing/dicing. The high-speed operation is optimum for food processing operations, such as puree, shredding of certain foods, and fine-chopping.

[0037] In various alternate embodiments, to accommodate varying geometries and configurations of the food processing device and the mechanical aspects contained within the housing of the food processing device, varying geared connections can be used to operate the gear shifting assembly of the food processing device.These varying gears can include, but are not limited to, worm gears, rack-and-pinion gears, crown-type gears, bevel gears, or other types of geared connections.

[0038] It will be understood by one having ordinary skill in the art that construction of the described device and other components is not limited to any specific material. Other exemplary embodiments of the device disclosed herein may be formed from a wide variety of materials, unless described otherwise herein.

[0039] For purposes of this disclosure, the term "coupled" (in all of its forms, couple, coupling, coupled, etc.) generally means the joining of two components (electrical or mechanical) directly or indirectly to one another. Such joining may be stationary in nature or movable in nature. Such joining may be achieved with the two components (electrical or mechanical) and any additional intermediate members being integrally formed as a single unitary body with one another or with the two components. Such joining may be permanent in nature or may be removable or releasable in nature unless otherwise stated.

[0040] It is also important to note that the construction and arrangement of the elements of the device as shown in the exemplary embodiments is illustrative only. Although only a few embodiments of the present innovations have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter recited. For example, elements shown as integrally formed may be constructed of multiple parts or elements shown as multiple parts may be integrally formed, the operation of the interfaces may be reversed or otherwise varied, the length or width of the structures and/or members or connector or other elements of the system may be varied, the nature or number of adjustment positions provided between the elements may be varied. It should be noted that the elements and/or assemblies of the system may be constructed from any of a wide variety of materials that provide sufficient strength or durability, in any of a wide variety of colors, textures, and combinations. Accordingly, all such modifications are intended to be included within the scope of the present innovations. Other substitutions, modifications, changes, and omissions may be made in the design, operating conditions, and arrangement of the desired and other exemplary embodiments without departing from the spirit of the present innovations.

[0041] It will be understood that any described processes or steps within described processes may be combined with other disclosed processes or steps to form structures within the scope of the present device. The exemplary structures and processes disclosed herein are for illustrative purposes and are not to be construed as limiting.

[0042] It is also to be understood that variations and modifications can be made on the aforementioned structures and methods without departing from the concepts of the present device, and further it is to be understood that such concepts are intended to be covered by the following claims unless these claims by their language expressly state otherwise.

[0043] The above description is considered that of the illustrated embodiments only. Modifications of the device will occur to those skilled in the art and to those who make or use the device. Therefore, it is understood that the embodiments shown in the

drawings and described above is merely for illustrative purposes and not intended to limit the scope of the device, which is defined by the following claims as interpreted according to the principles of patent law, including the Doctrine of Equivalents.

What is claimed is:

1. A multiple-speed food processing device comprising:

a drive assembly;

a primary idler shaft including first and second drive gears;

a secondary idler shaft;

a gear shift assembly including a shifting gear disposed between the first and second drive gears, the gear shift assembly being moveable to a first position wherein the first drive gear is engaged with the drive assembly such that the primary idler shaft rotates at a first rate of rotation, the gear shift assembly also being moveable to a second position wherein the second drive gear is engaged with the drive assembly by the secondary idler shaft such that the primary idler shaft rotates at a second rate of rotation; and

a control in communication with the shifting gear, wherein the operation of the control moves the shifting gear between the first and second positions.

2. The multiple-speed food processing device of claim 1, wherein the shifting gear is configured to vertically adjust the position of the primary idler shaft relative to the drive assembly.

3. The multiple-speed food processing device of claim 1, wherein the drive assembly includes a relay gear configured to interface with both the primary idler shaft and the secondary idler shaft at the same time.

4. The multiple-speed food processing device of claim 1, wherein the control includes a control gear that is operably coupled to a gear slide.

5. The multiple-speed food processing device of claim 4, further comprising:

a linking gear operably coupling the gear slide with the shifting gear.

6. The multiple-speed food processing device of claim 1, wherein a longitudinal extent of the primary idler shaft and a longitudinal extent of the secondary idler shaft are parallel.

7. The multiple-speed food processing device of claim 1, wherein the shifting gear includes an intermediate idle position, wherein the primary idler shaft is selectively disengaged from the drive assembly.

8. A multiple-speed food processing device comprising:

a drive assembly;

a primary idler shaft including first and second drive gears that are vertically translatable;

a secondary idler shaft including an input gear rotationally coupled to the drive assembly, and an output gear;

a gear shift assembly including a shifting gear coupled with the primary idler shaft, the shifting gear being configured to vertically translate the first and second drive gears to a lowered position, wherein the first drive gear is engaged directly with the drive assembly, the shifting gear also being configured to vertically translate the first and second drive gears to a raised position, wherein the second drive gear is engaged with the output gear of the secondary idler shaft such that the primary idler shaft rotates at a second rate of rotation; and

a control in communication with the gear shift assembly, the control including a gear slide configured to rotate the shifting gear which results in vertical translation of the first and second drive gears between the lowered position and the raised position.

9. The multiple-speed food processing device of claim 8, wherein the shifting gear is configured to vertically adjust the position of the primary idler shaft relative to the drive assembly.

10. The multiple-speed food processing device of claim 8, wherein the drive assembly includes a relay gear configured to interface with both the primary idler shaft and the secondary idler shaft at the same time.

11. The multiple-speed food processing device of claim 8, wherein the control includes a control gear that is operably coupled to a gear slide.

12. The multiple-speed food processing device of claim 11, further comprising:

a linking gear operably coupling the gear slide with the shifting gear.

13. The multiple-speed food processing device of claim 8, wherein a longitudinal extent of the primary idler shaft and a longitudinal extent of the secondary idler shaft are parallel.

14. The multiple-speed food processing device of claim 10, wherein the relay gear selectively engages the first drive gear when the shifting gear is in the first position, and wherein the relay gear is in continual engagement with the input gear of the secondary idler shaft.

15. The multiple-speed food processing device of claim 8, wherein the shifting gear includes an intermediate idle position, wherein the primary idler shaft is selectively disengaged from the drive assembly.

16. A multiple-speed food processing device comprising:

a housing that includes a drive assembly disposed therein;

a primary idler shaft;

a secondary idler shaft including an input gear rotationally coupled to the drive assembly, and an output gear selectively rotationally coupled to the primary idler shaft;

a gear shift assembly including a shifting gear in communication with the primary idler shaft, the shifting gear being configured to directly engage the primary idler shaft with the drive assembly such that the primary idler shaft rotates at a first rate of rotation, and also to directly engage the output gear of the secondary idler shaft with the primary idler shaft such that the primary idler shaft rotates at a second rate of rotation; and

a control in communication with the gear shift assembly.

17. The multiple-speed food processing device of claim 16, wherein the drive assembly includes a relay gear configured to interface with both the primary idler shaft and the secondary idler shaft at the same time.

18. The multiple-speed food processing device of claim 16, wherein the control includes a control gear that is operably coupled to a gear slide.

19. The multiple-speed food processing device of claim 18, further comprising:
a linking gear operably coupling the gear slide with the shifting gear.

20. The multiple-speed food processing device of claim 16, wherein the shifting gear includes an intermediate idle position, wherein the primary idler shaft is selectively disengaged from the drive assembly.

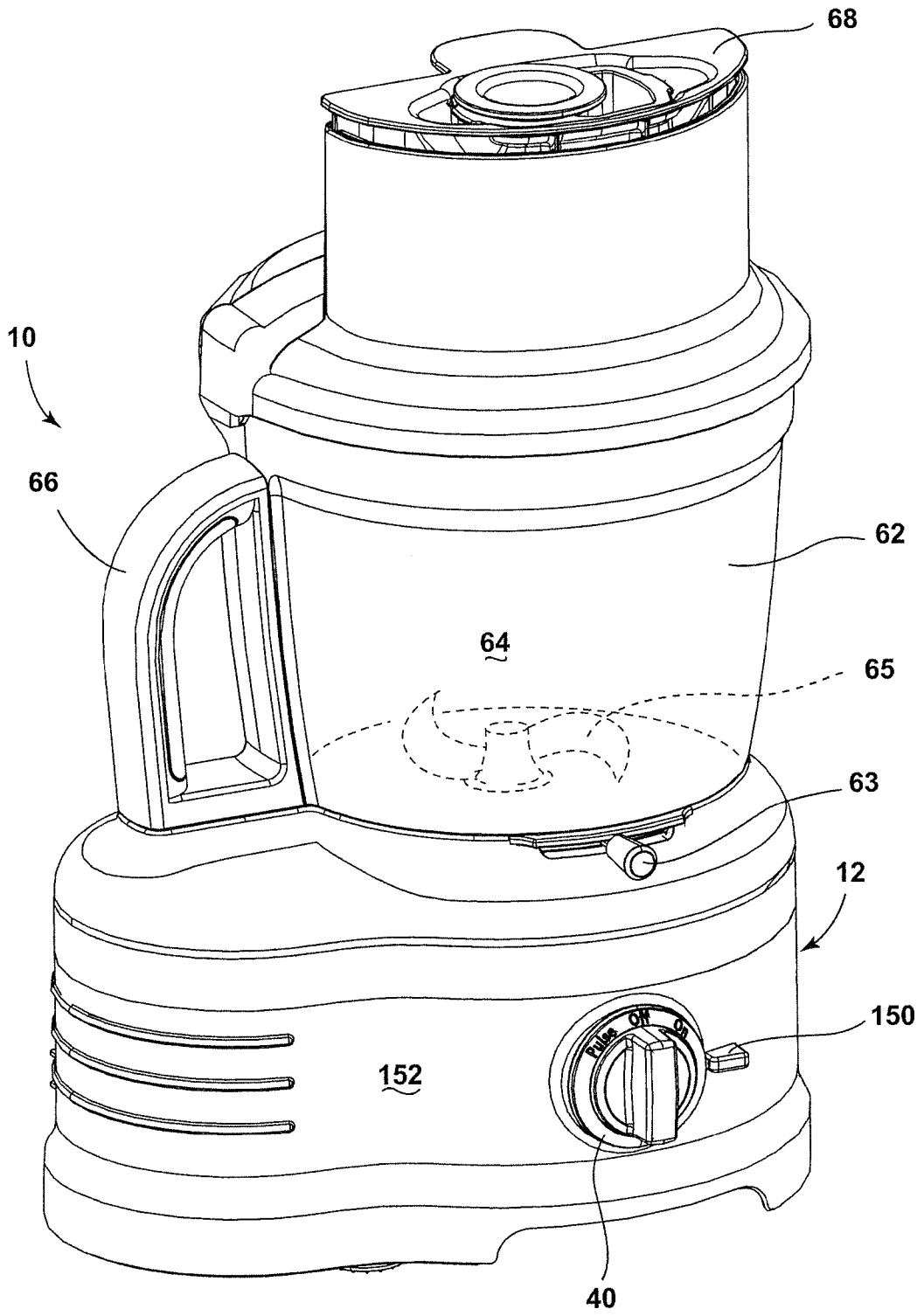


FIG. 1

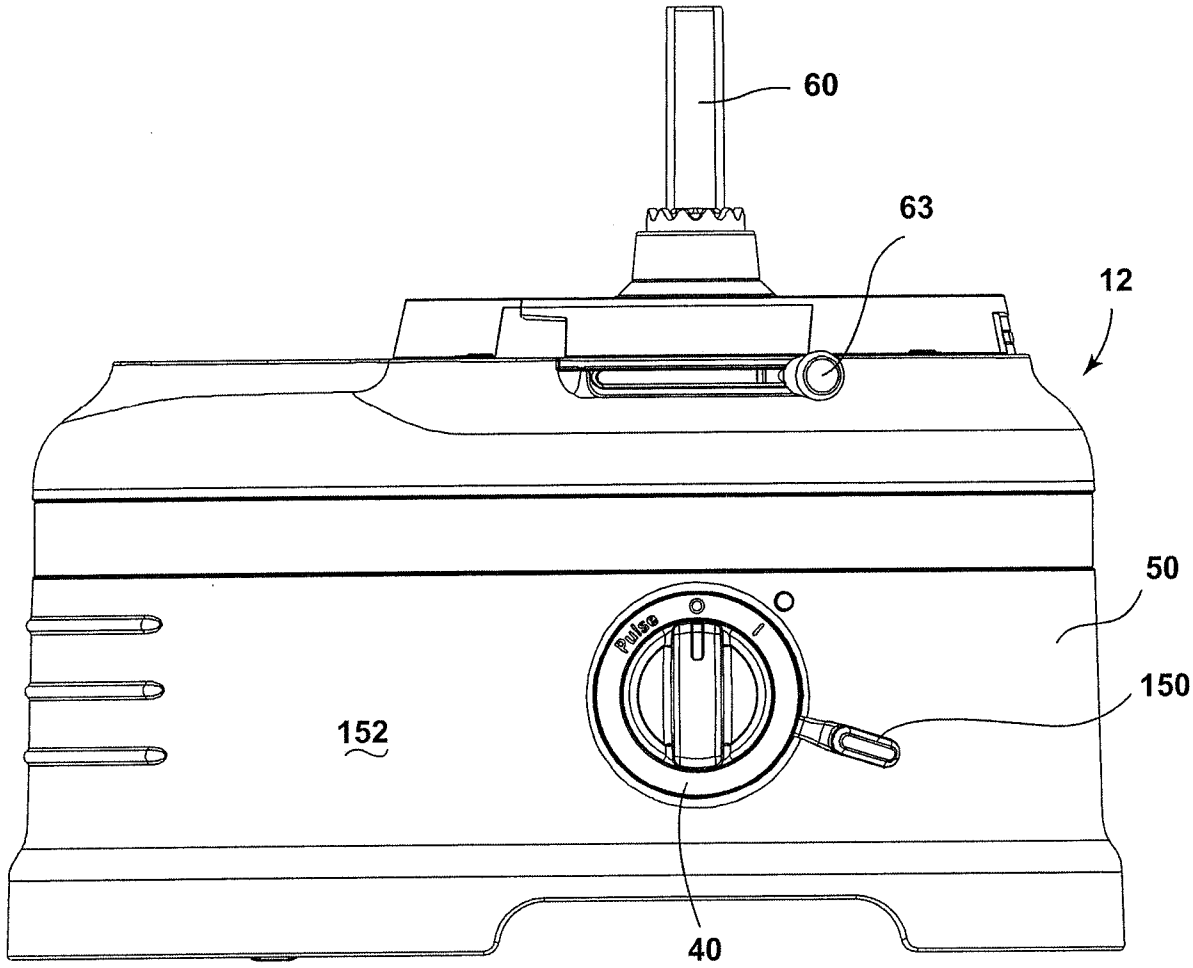


FIG. 2

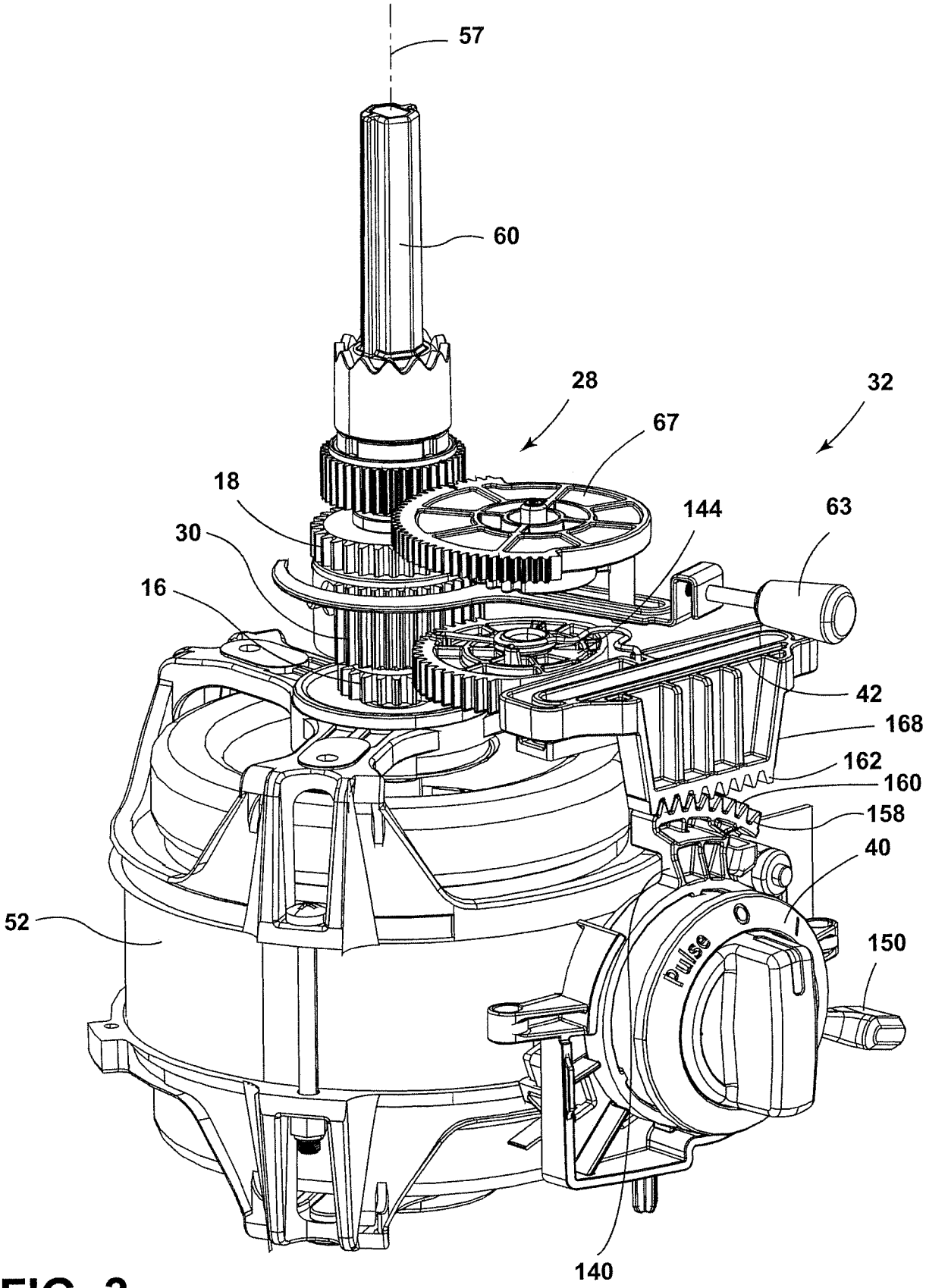

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FIG. 3

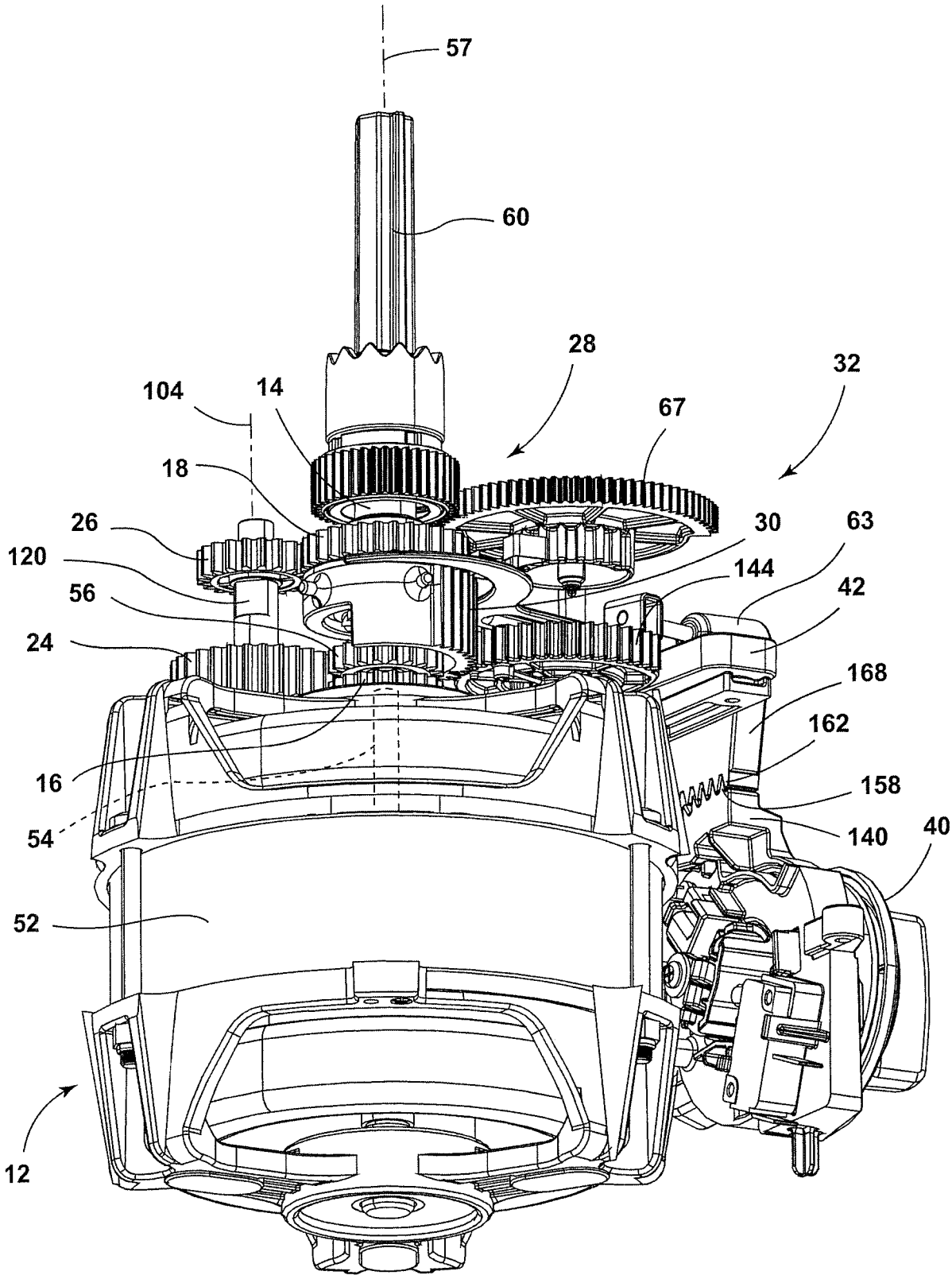

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FIG. 4

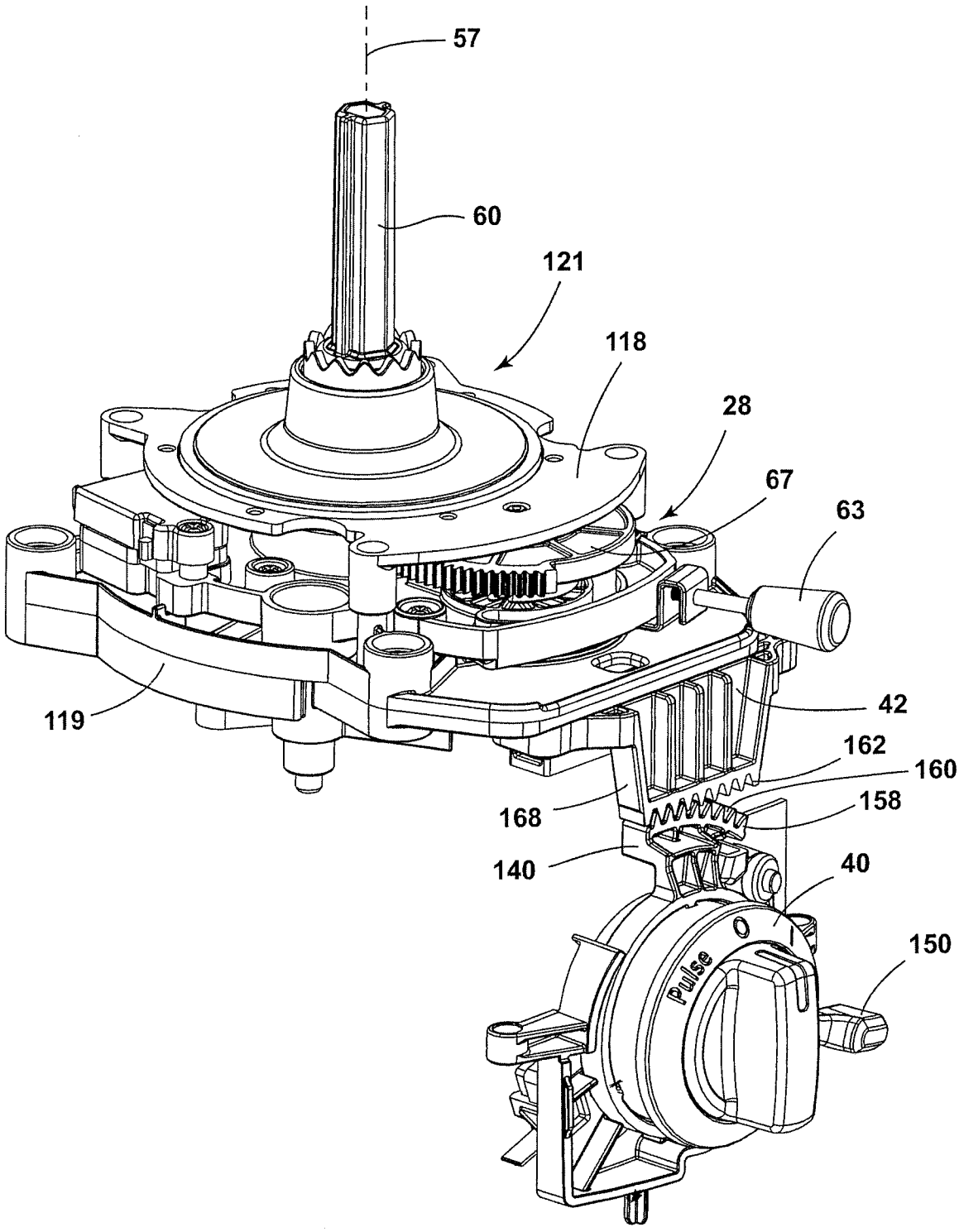


FIG. 5

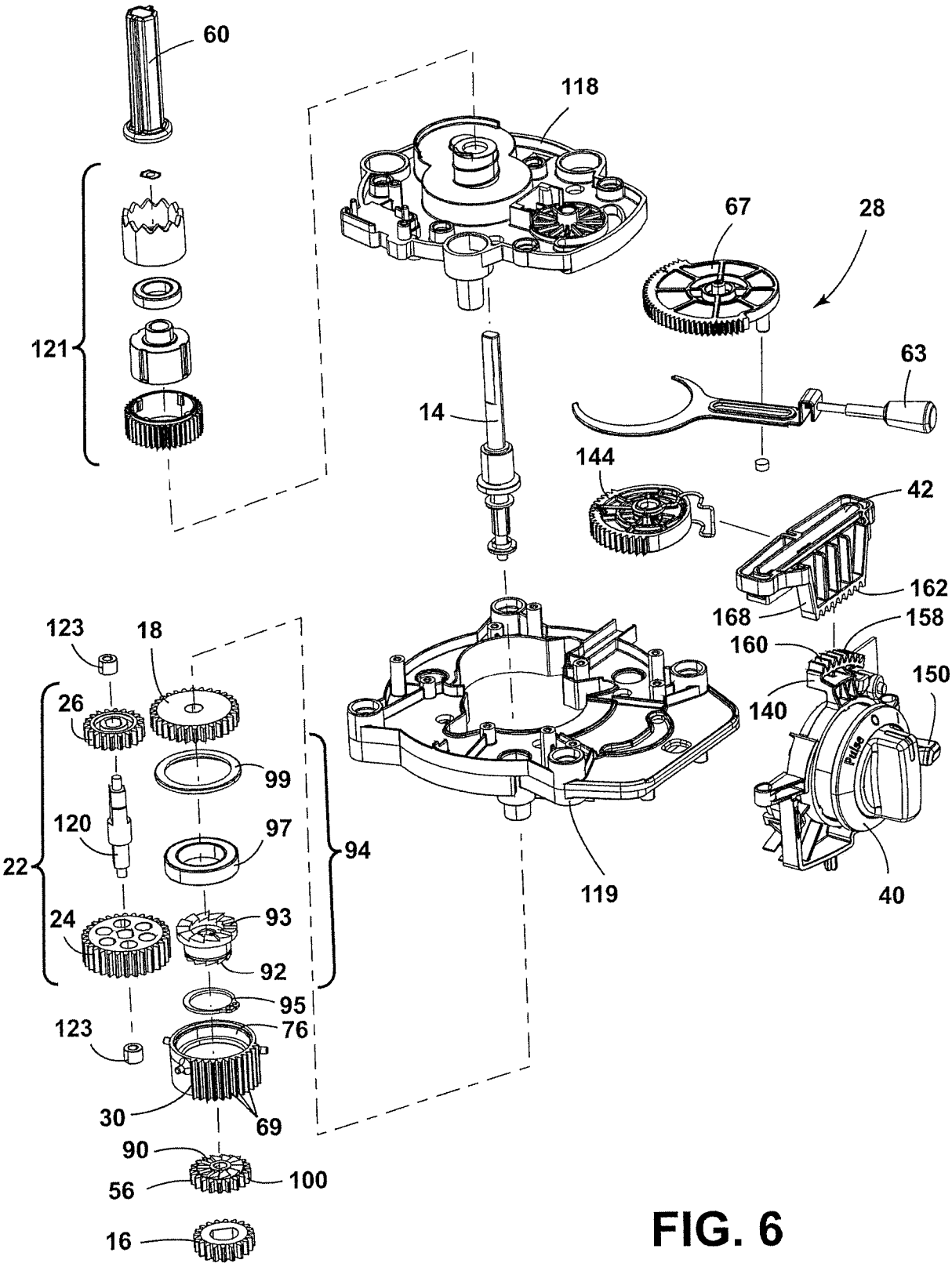

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FIG. 6

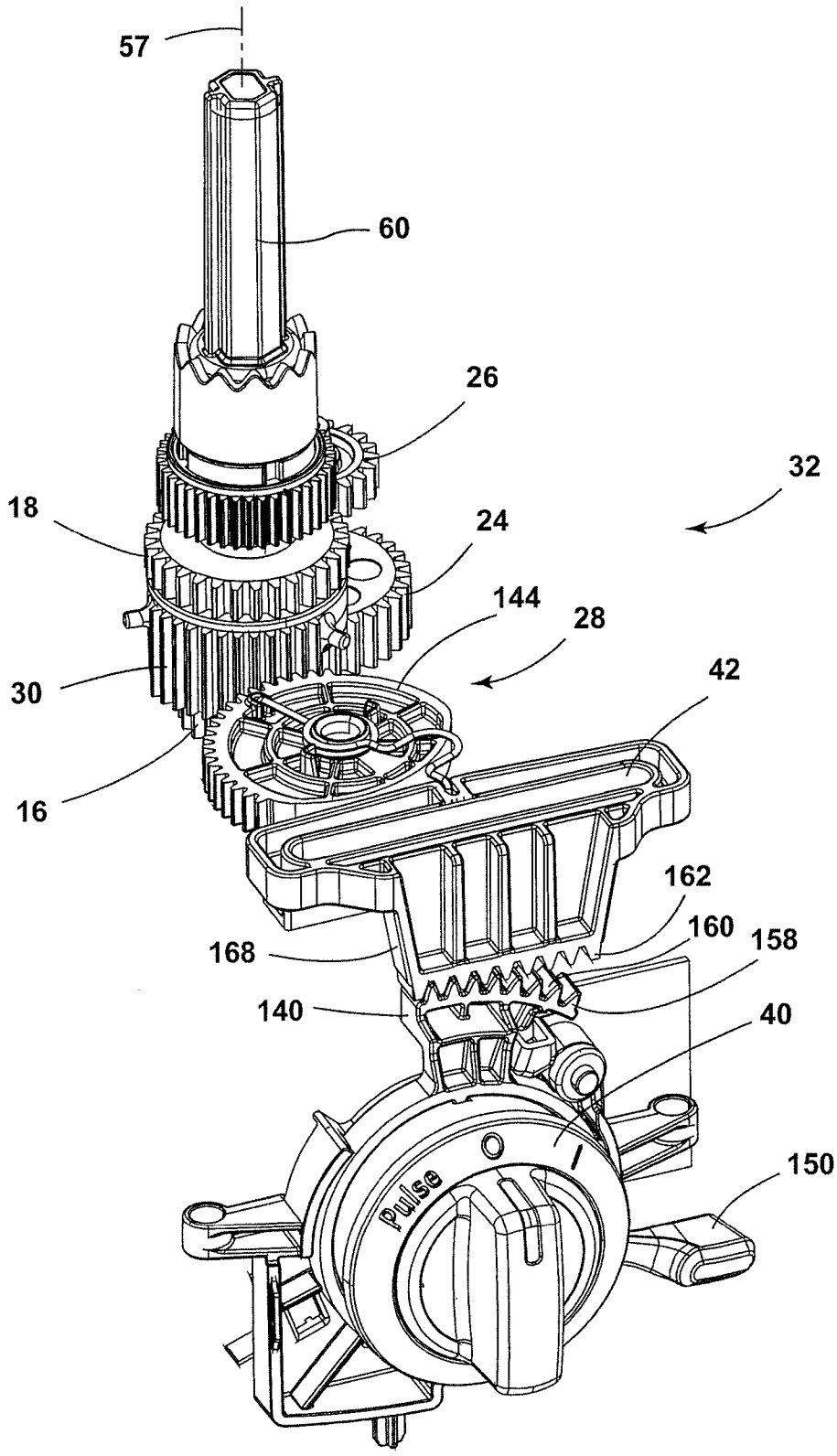


FIG. 7

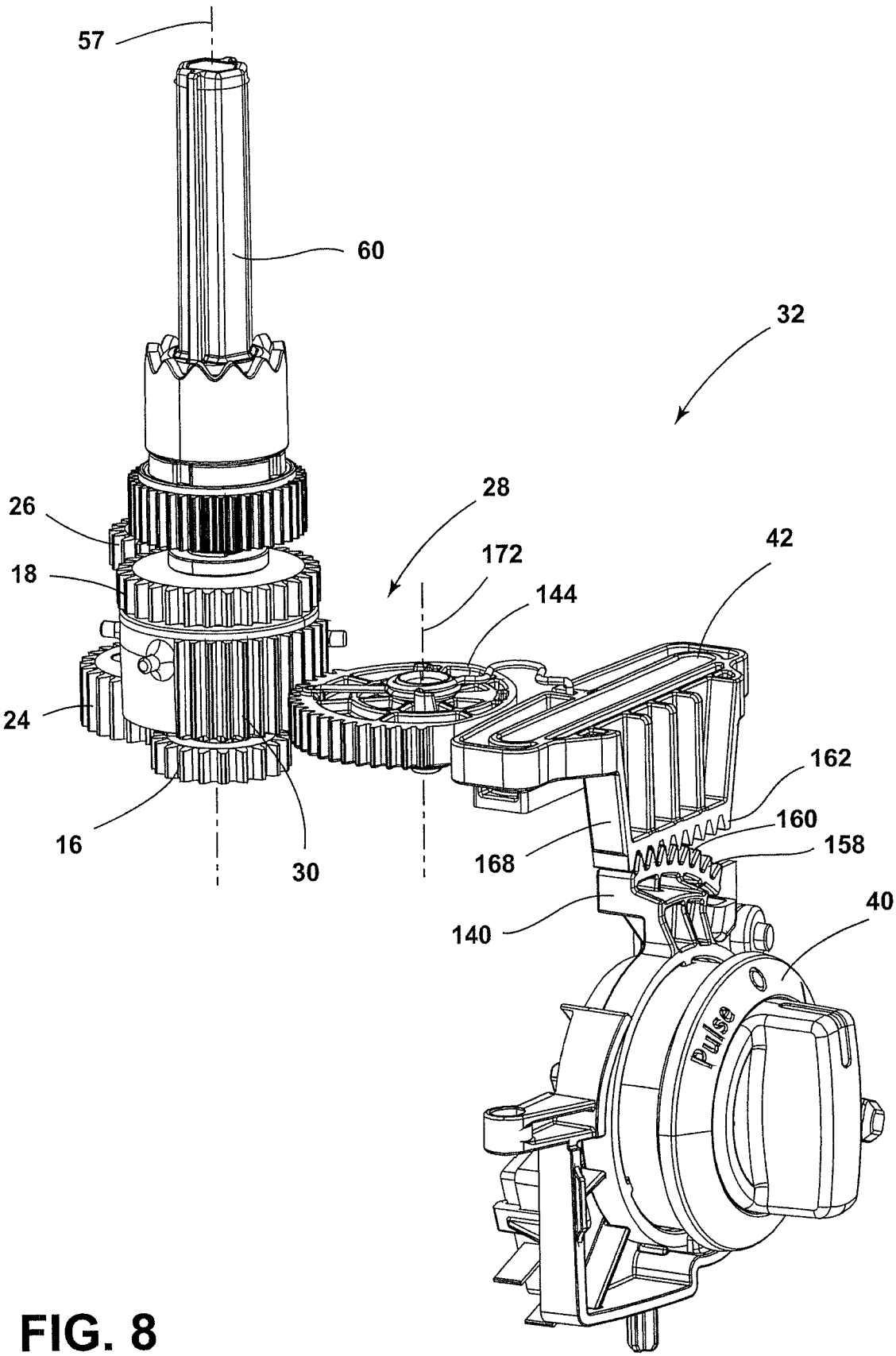


FIG. 8

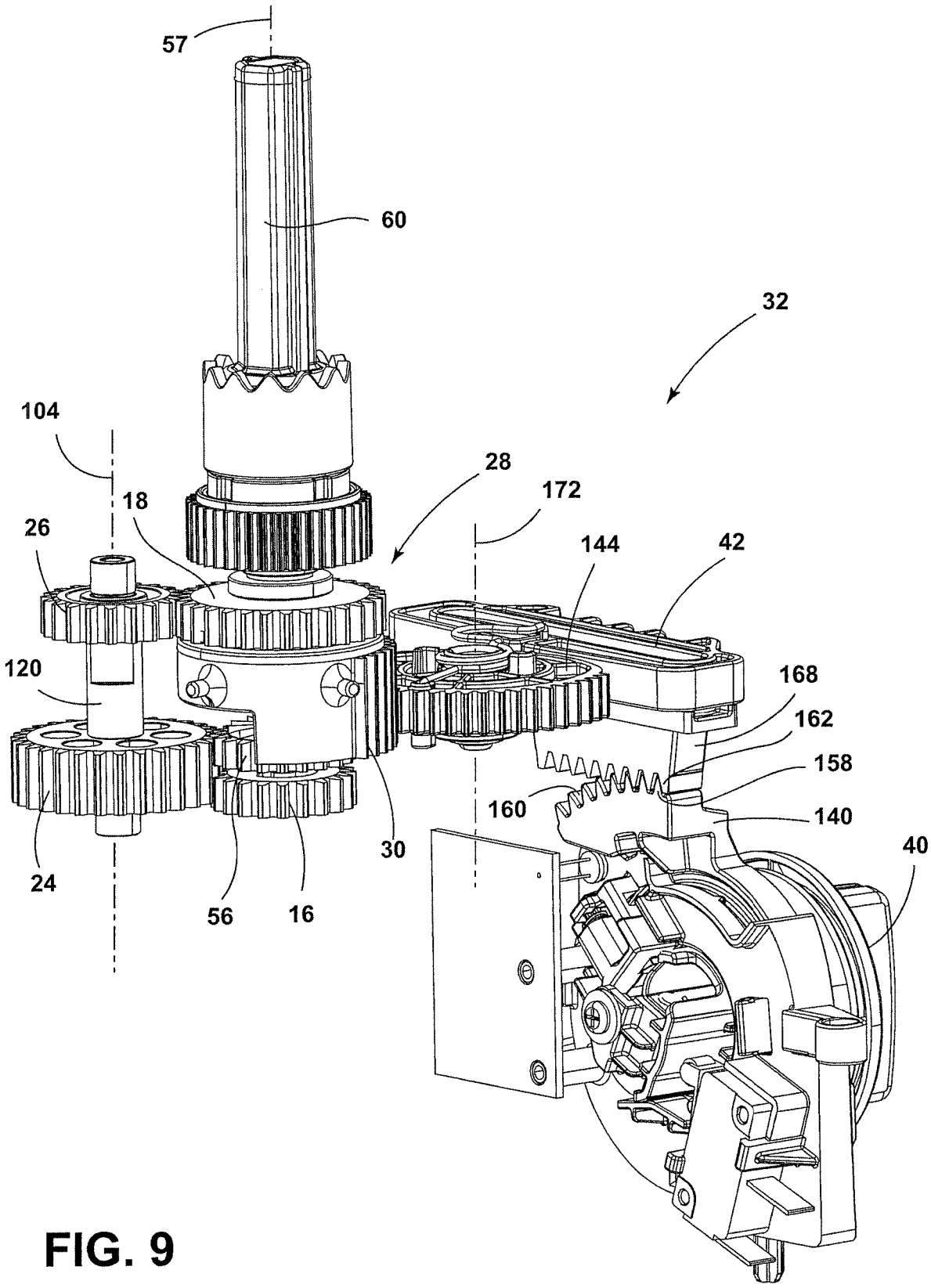

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FIG. 9

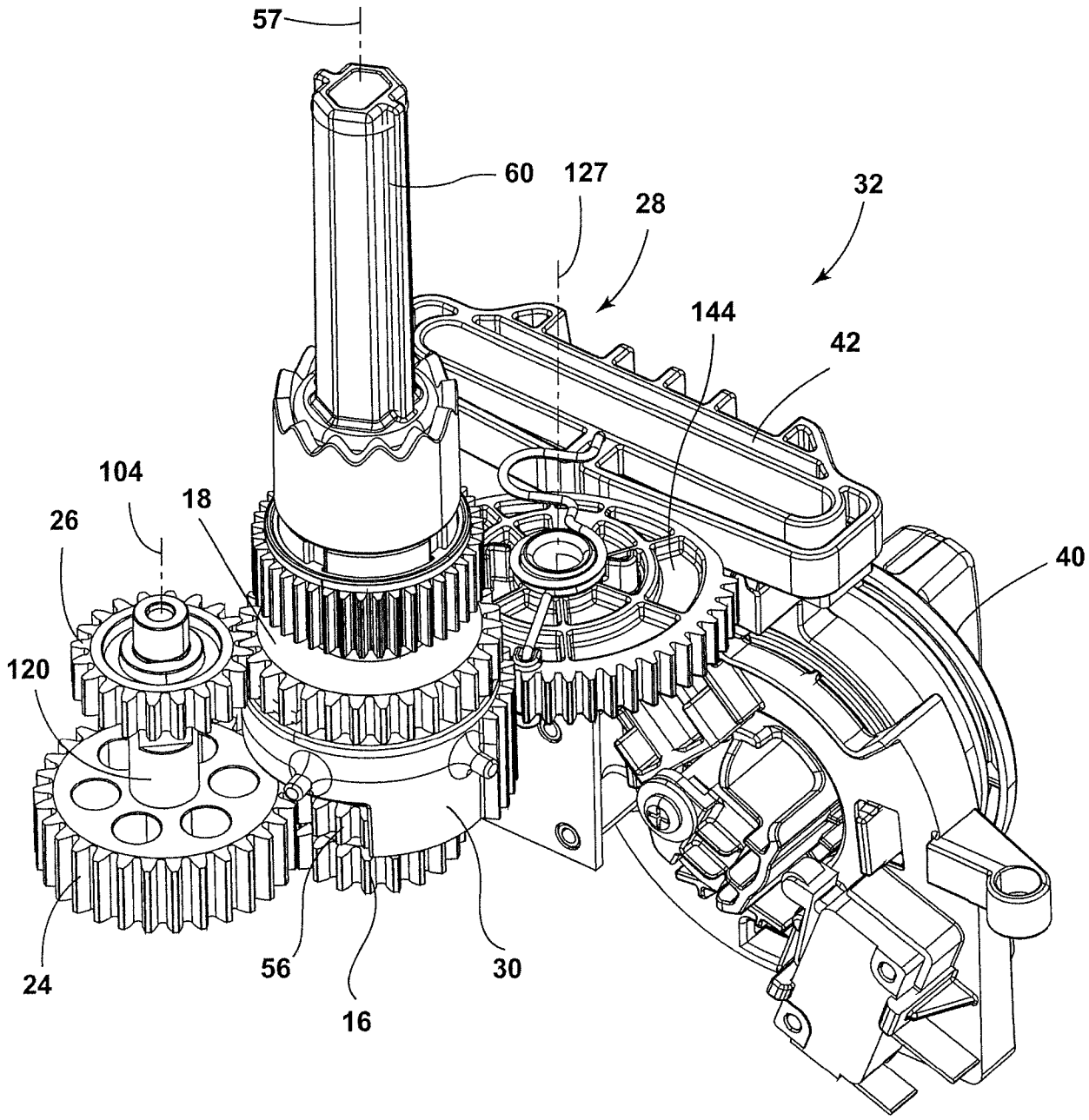


FIG. 10

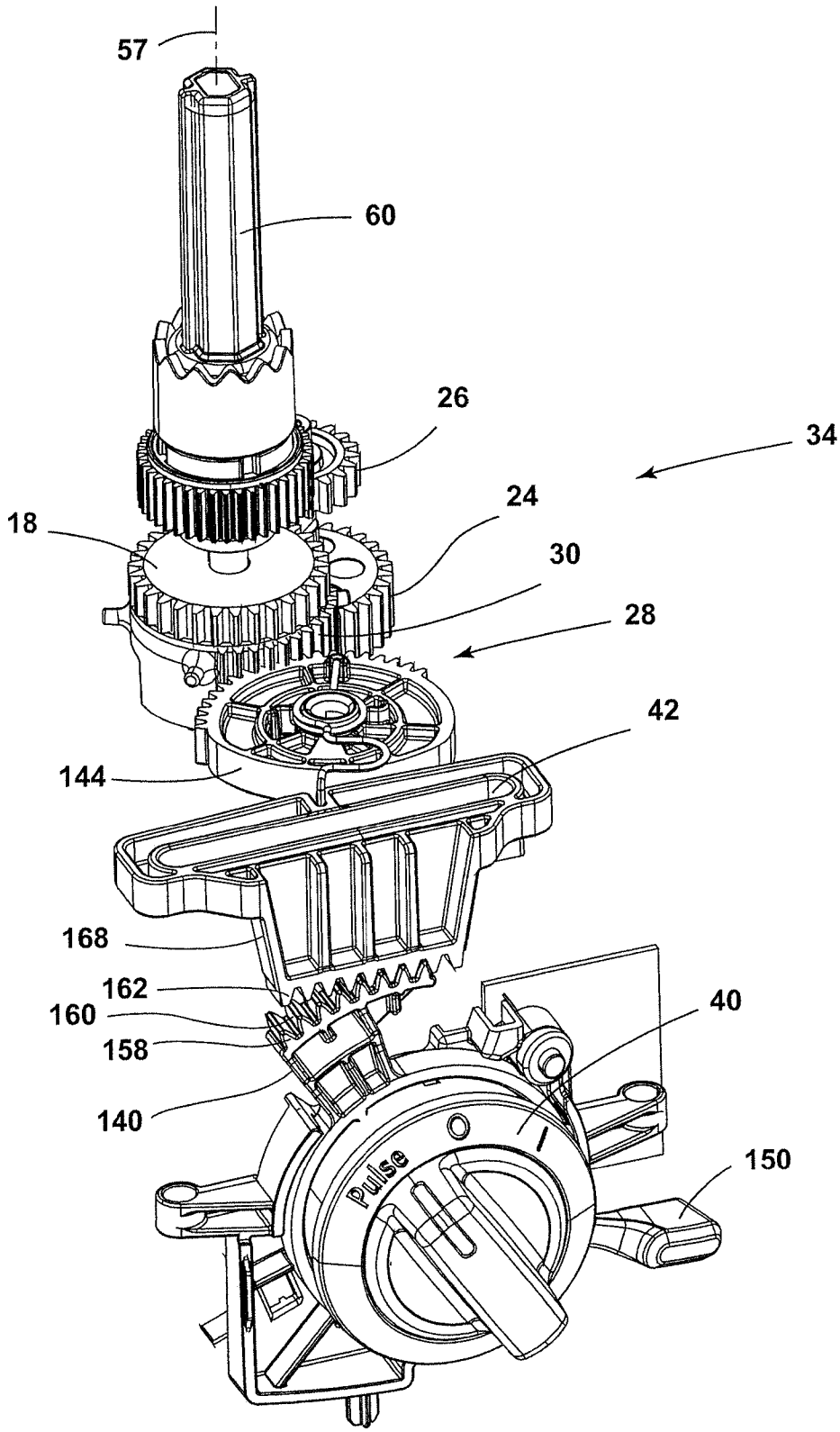


FIG. 11

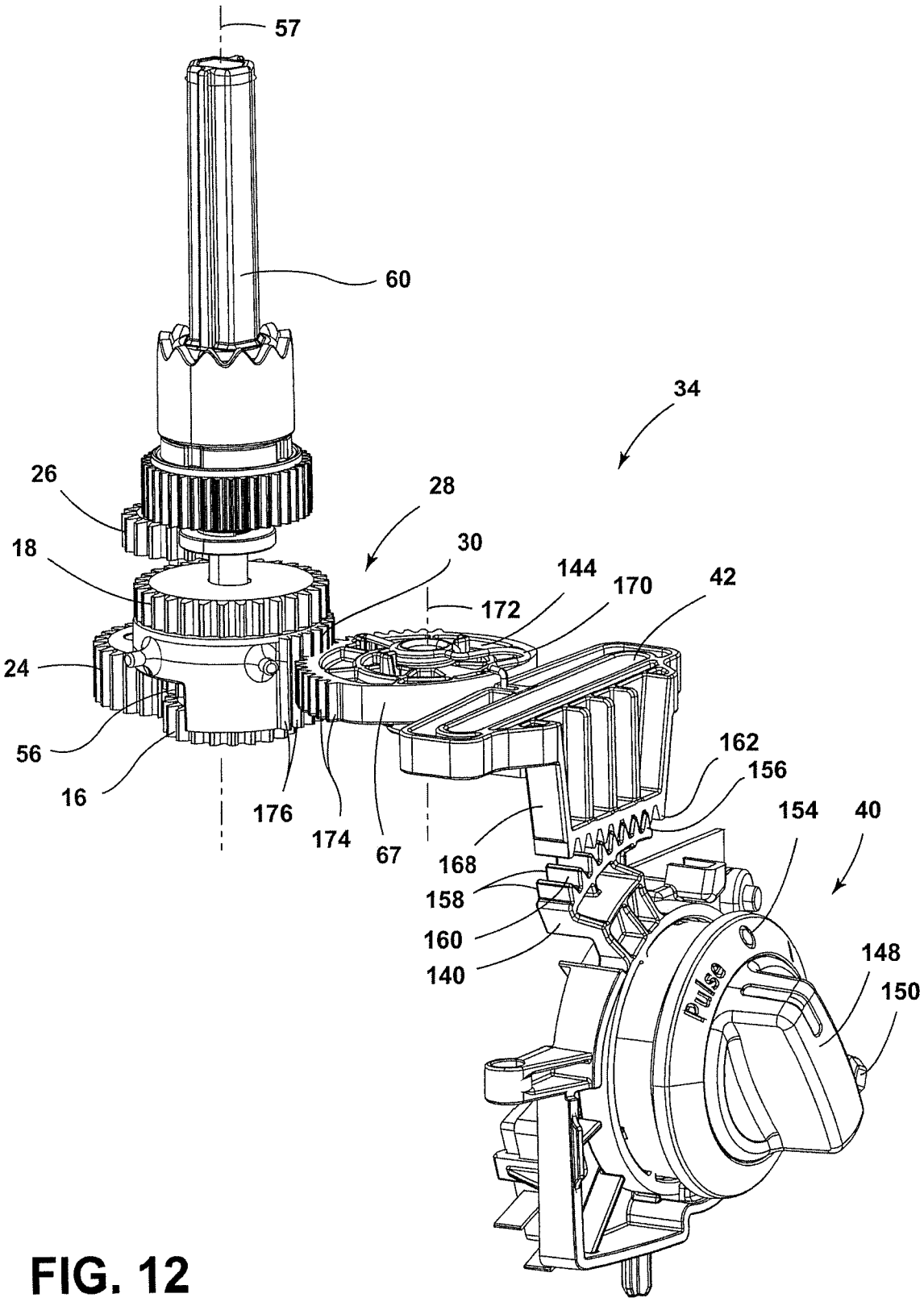

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FIG. 12

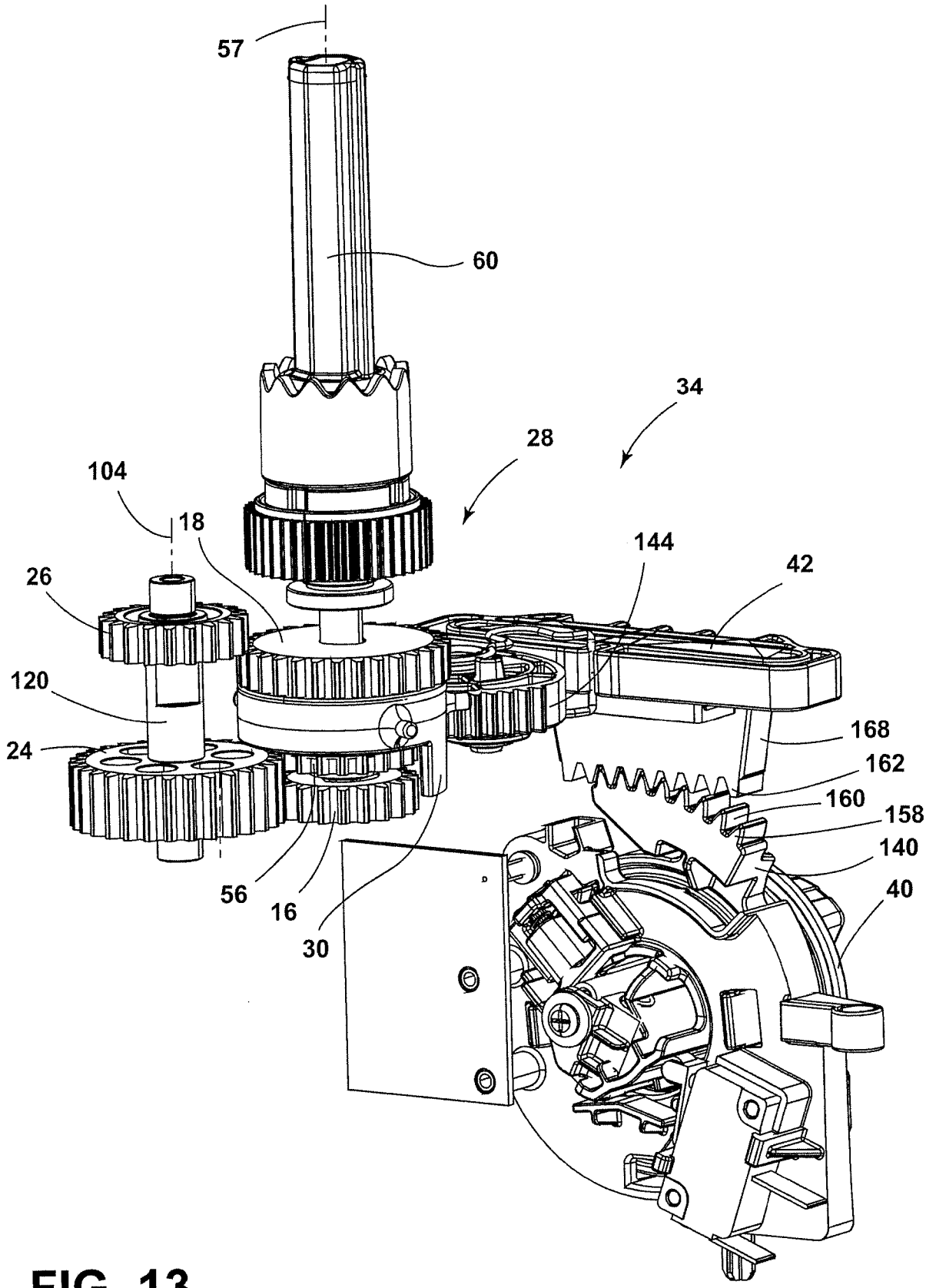


FIG. 13

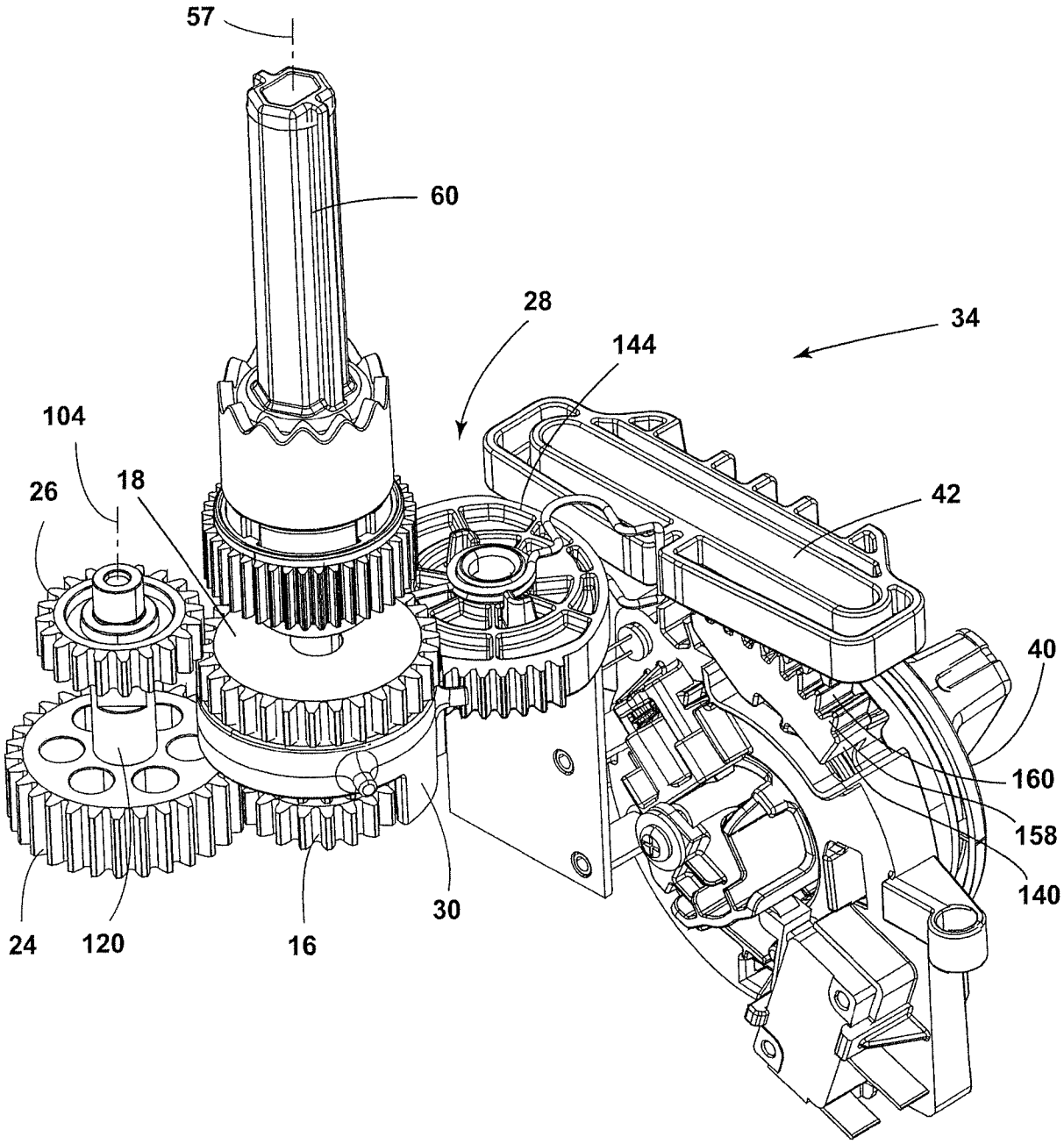


FIG. 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/078270

A. CLASSIFICATION OF SUBJECT MATTER

see the extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47J 43/-, A23L 1/-, A47J 31/-, A23N 1/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, CNPAT, CNKI: MULTIPLE SPEED, idler shaft, shaft, gear, shift, rotate, rate, speed, velocity, first, second

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5483848 A (BRAUN AKTIENGESELLSCHAFT) 16 January 1996 (16.01.1996) see description, column 2, line 56 to column 4, line 7 and figures 1-2	1-3,6-10,13-17,20
Y	US 2004/0141411 A1 (Olivia Huang et al.) 22 July 2004 (22.07.2004) see claim 1 and figure 5	1-3,6-10,13-17,20
A	JP H5-31036 A (TOKYO ELECTRIC CO LTD) 09 February 1993 (09.02.1993) the whole document	1-20
A	CN 201445319 U (YAHONG ELECTRONIC CO LTD et al.) 05 May 2010 (05.05.2010) the whole document	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 Feb. 2014 (28.02.2014)	**27 Mar. 2014 (27.03.2014)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer WEN, Guanghui Telephone No. (86-10)62085858

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/078270

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US 5483848 A	16.01.1996	DE 59406588 D1	10.09.1998
		DE 4310847 C1	17.03.1994
		EP 0617910 B1	05.08.1998
		EP 0617910 A1	05.10.1994
US 2004/0141411 A1	22.07.2004	US 6824303 B2	30.11.2004
		TW 588628 U	21.05.2004
JP H5-31036 A	09.02.1993	None	
CN 201445319 U	05.05.2010	None	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/078270

(Continuation of second sheet) **A. CLASSIFICATION OF SUBJECT MATTER**

A47J 43/08 (2006.01) i

F16H 3/08 (2006.01) i

A23N 1/02 (2006.01) i