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(54) **BLENDER WITH CRUSHED ICE FUNCTIONALITY**

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A47J 43/07 (2006.01)

(52) **U.S. Cl.**
CPC ***A47J 43/042*** (2013.01); ***A47J 43/07*** (2013.01); *Y10S 241/17* (2013.01)

(58) **Field of Classification Search**
CPC A47J 43/042; A47J 43/07; Y10S 241/17
See application file for complete search history.

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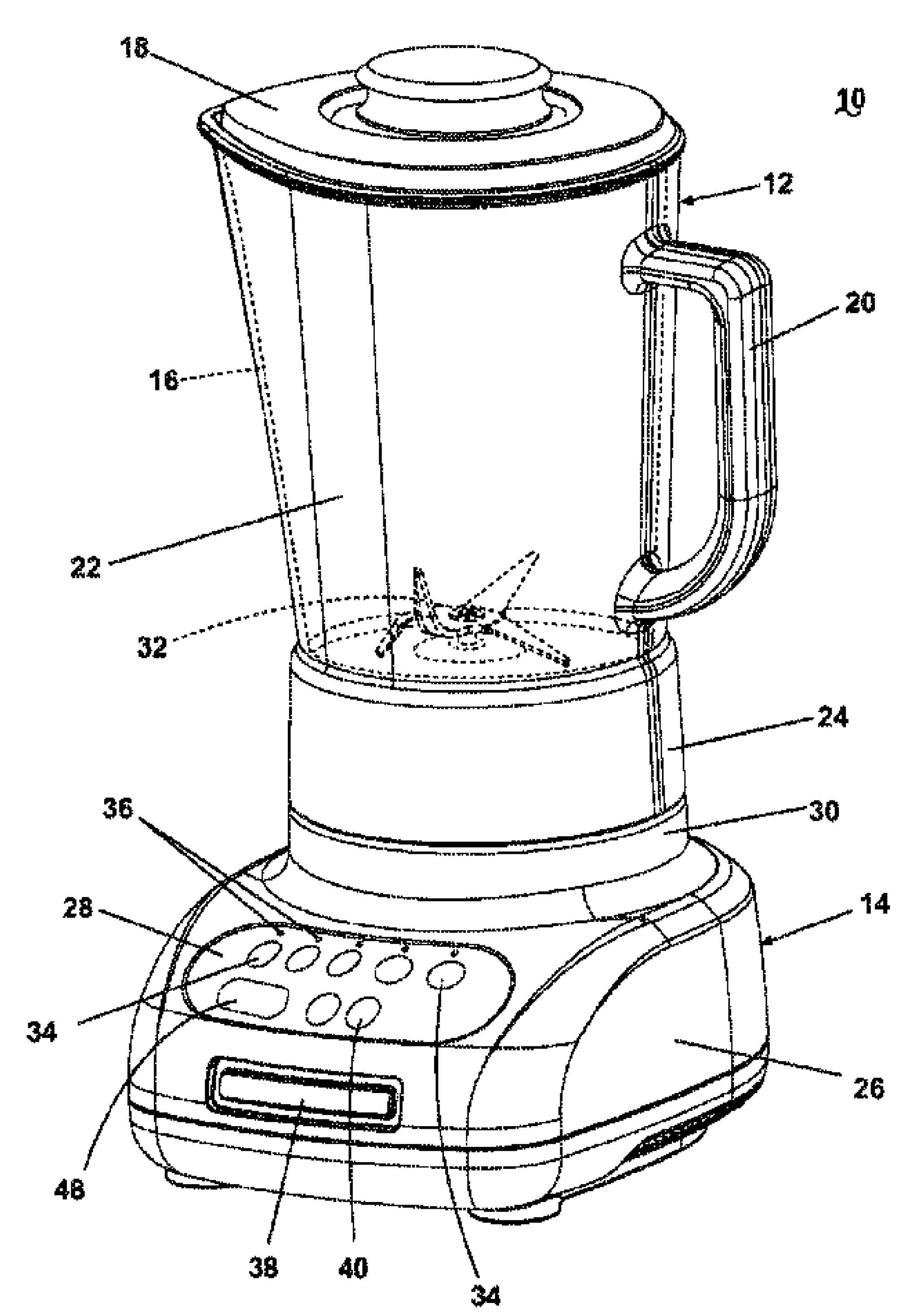
(57) **ABSTRACT**

Processing food items in a blender by operating the cutter assembly at a predetermined operating speed, reducing the operating speed of the cutter assembly t, and accelerating the operating speed of the cutter assembly in response to the items in the container having settled around the cutter assembly until the food items are suspended above the cutter assembly.

28 Claims, 5 Drawing Sheets



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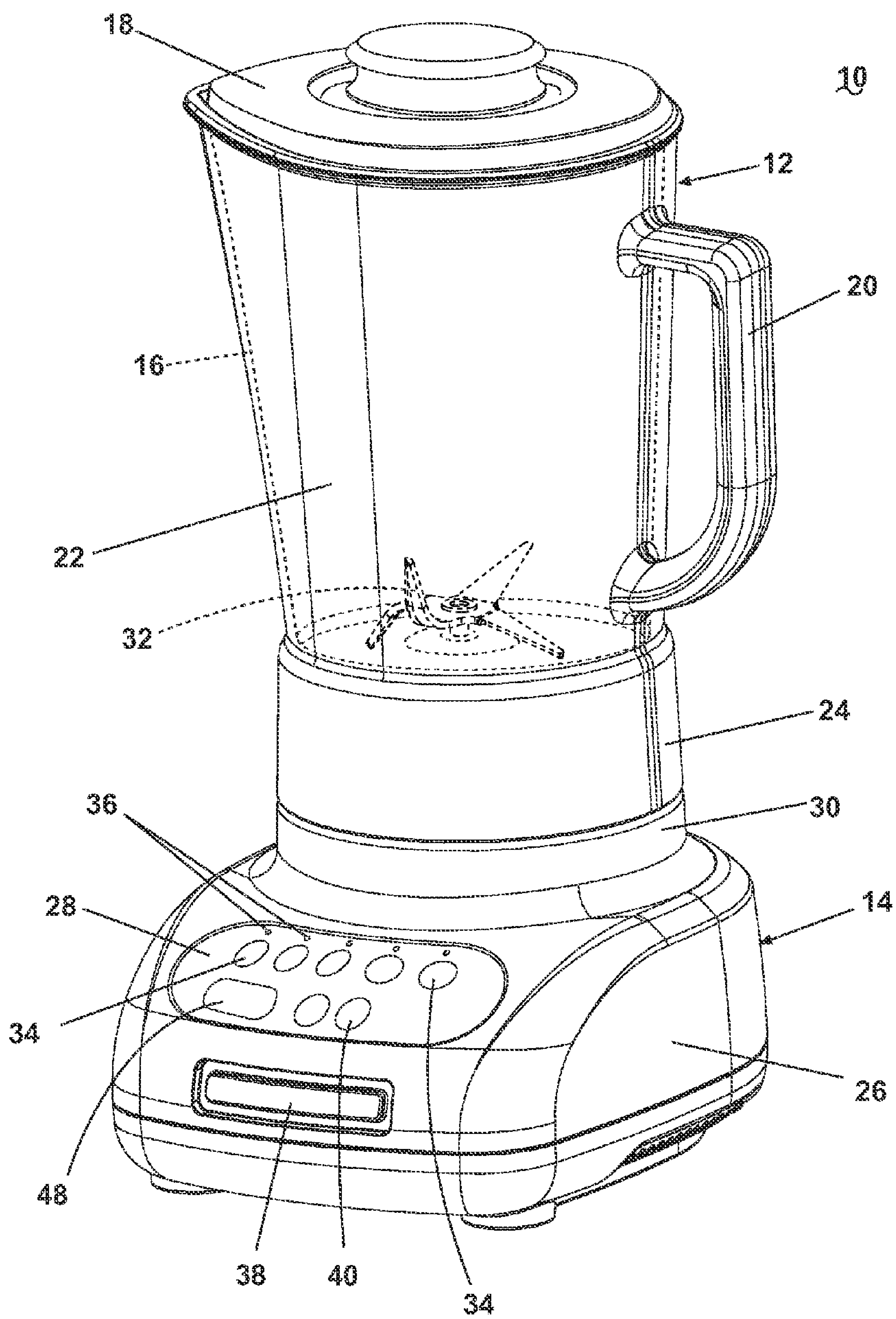

Fig. 1

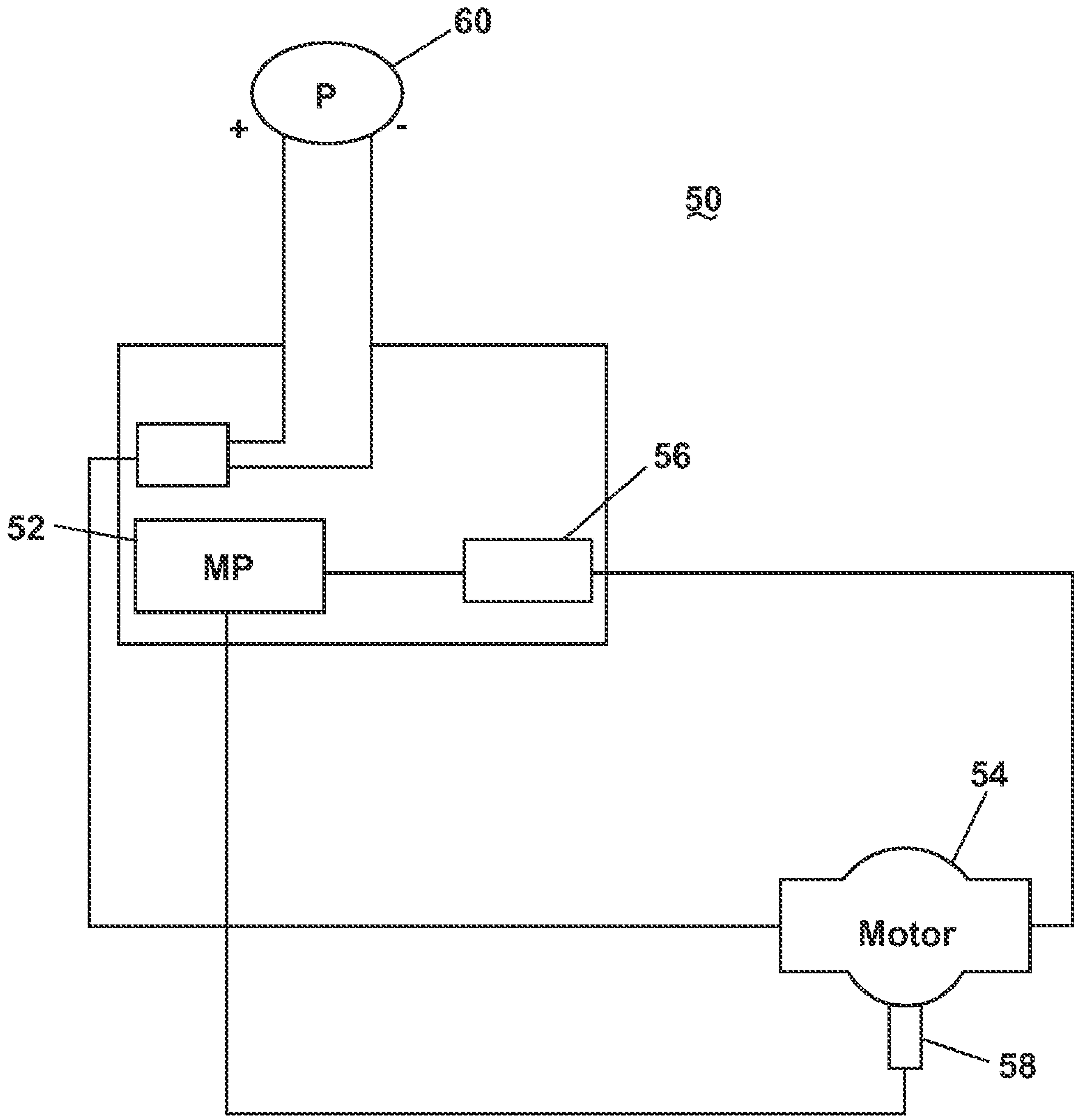

Fig. 2

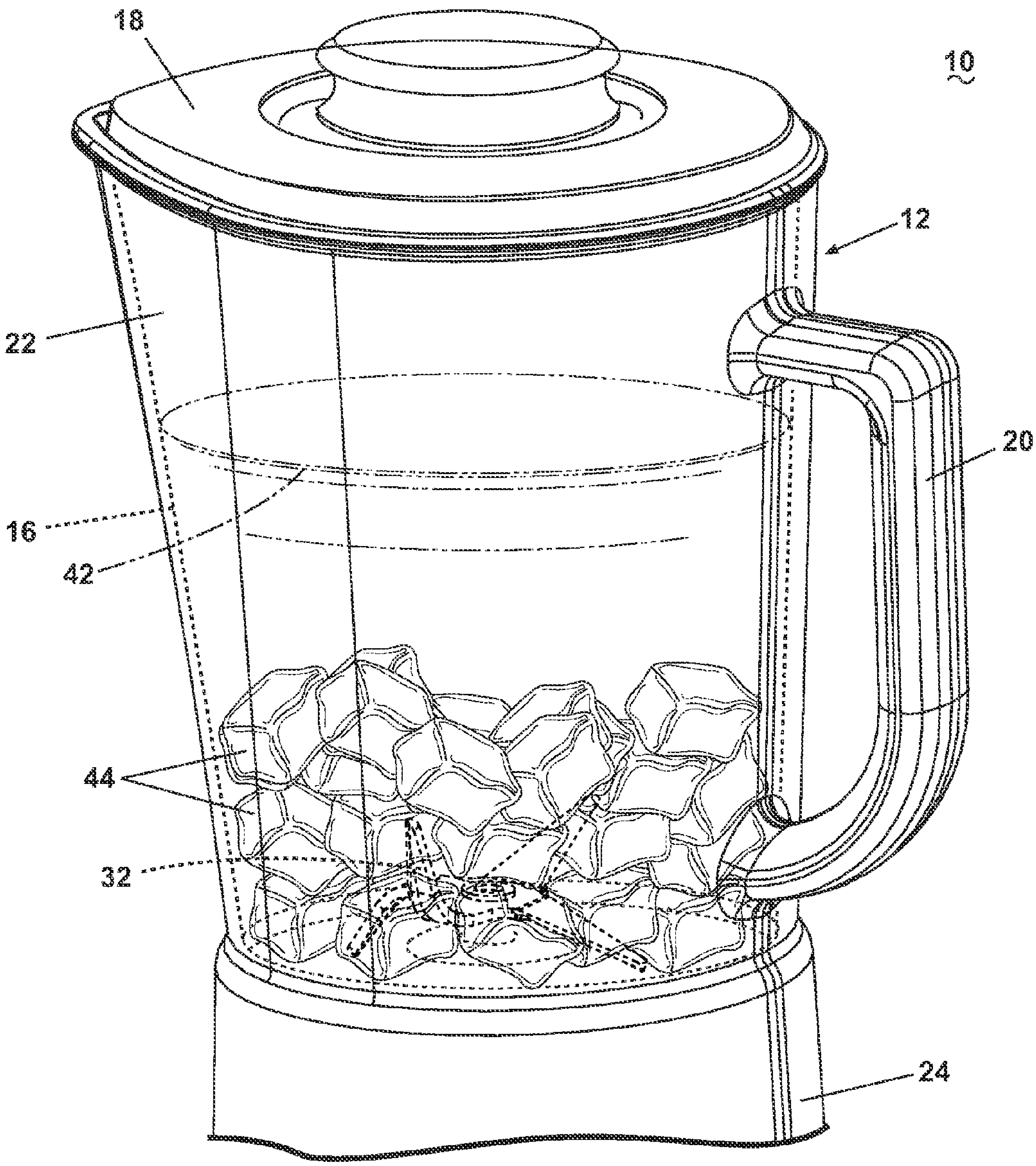

Fig. 3

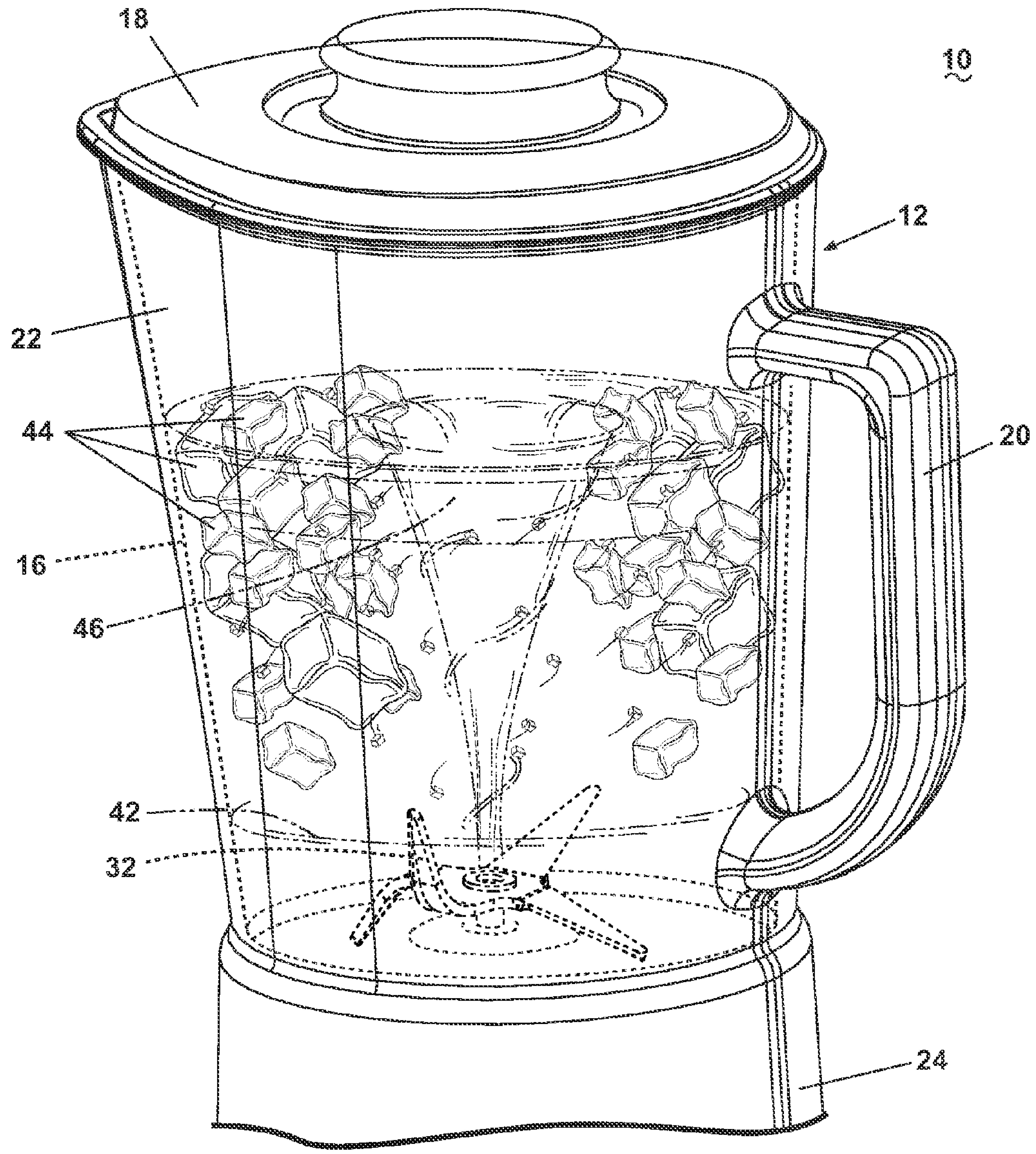

Fig. 4

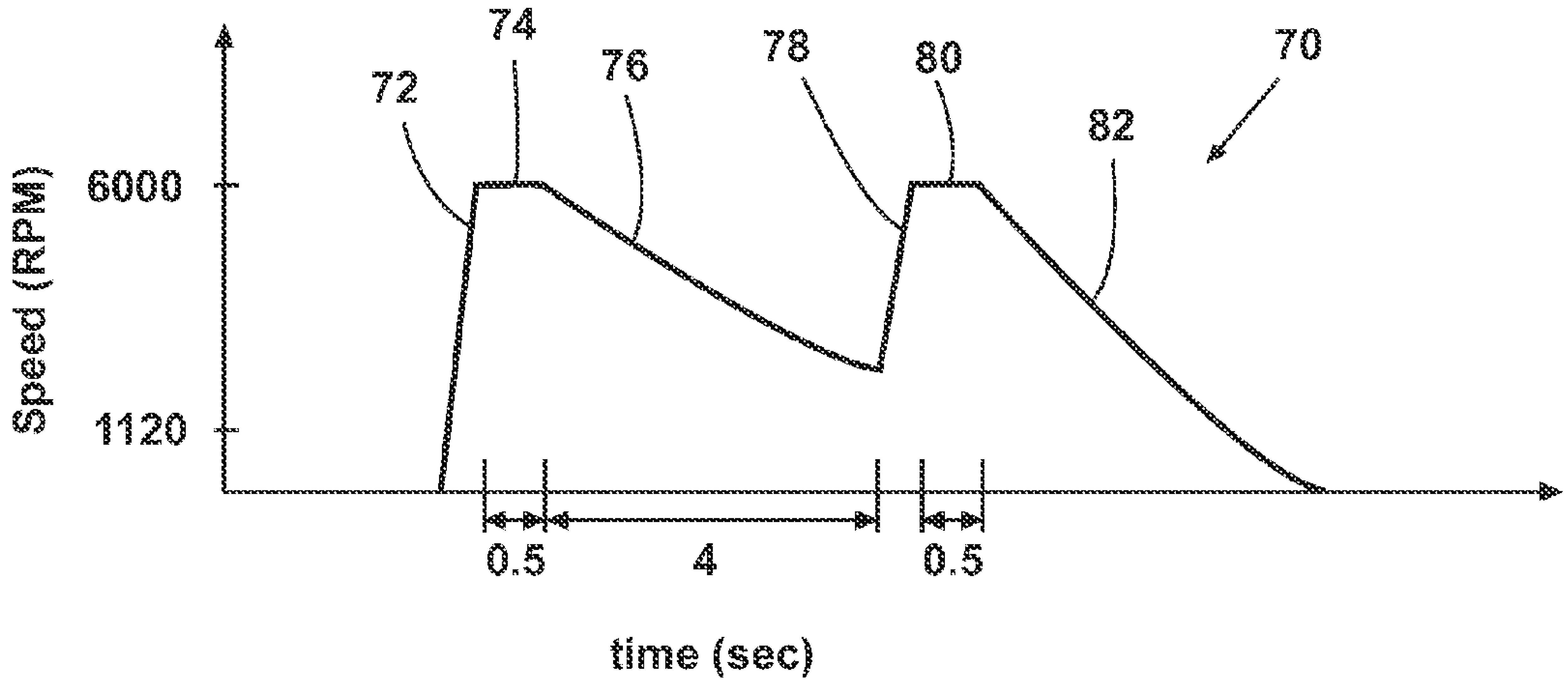
70
72
74
76
78
80
82
Speed (RPM)
6000
1120
0.5
4
0.5
time (sec)

Fig. 5

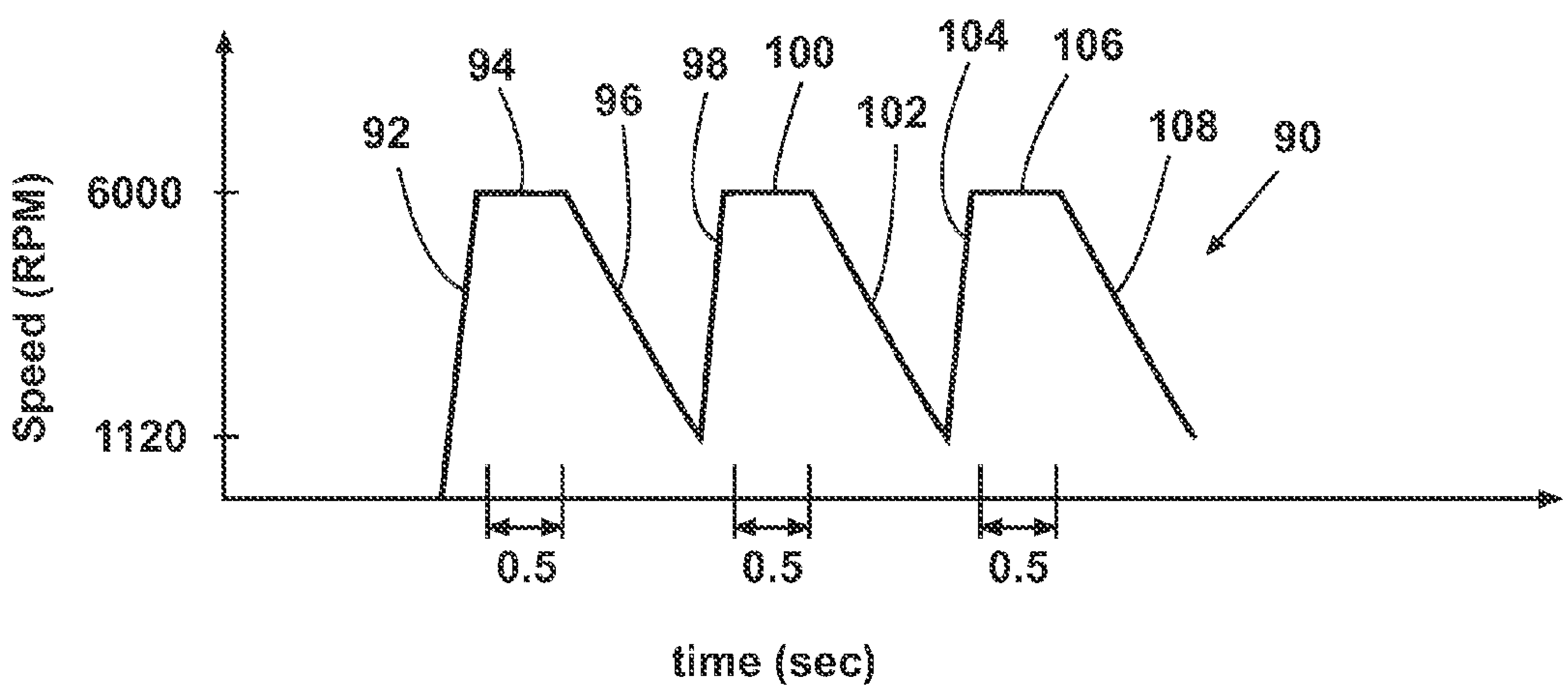
90
92
94
96
98
100
102
104
106
108
Speed (RPM)
6000
1120
0.5
0.5
0.5
time (sec)

Fig. 6

BLENDER WITH CRUSHED ICE FUNCTIONALITY

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to household blenders, and more particularly to a household blender having a crushed ice functionality.

2. Description of the Related Art

Culinary blenders are ubiquitous in a conventional commercial or household kitchen. Such appliances typically comprise a selectively closable, open-top reservoir or container having a multiple-bladed cutter assembly at a lower portion of the reservoir which is rotated about a vertical axis by a motor driven shaft extending through the bottom of the reservoir. The blades are typically configured to both pulverize and mix the contents in the reservoir, and are used to process solid and semi-solid food items, liquids, and mixtures of solid and liquid food items. Mixing is most efficiently achieved by a pattern of movement that introduces the entire contents of the reservoir into contact with the rotating blades during the mixing operation.

Conventional countertop blenders frequently include a functionality for processing crushed ice from ice cubes for beverages, deserts, confections, and the like. This functionality typically comprises a timed pulsing pattern, which is initiated by the operator actuating a dedicated ice crushing function switch. The pulsing pattern is typically achieved by cycling the operation of the blender between a preselected duration of "on" time and a preselected duration of "off" time according to a preprogrammed sequence of pulsations. For example, the "on" time may be 0.1 second followed by an "off" time of 0.2 second, which is repeated until the blender is stopped by the operator again actuating the crushed ice function switch.

This preprogrammed "on-off" sequence enables hands-free operation of the blender, but the constant, regular pulsing pattern is not efficient, nor does it always result in properly crushed ice. This is due to the high variation in the properties and quantities of the contents in the reservoir, as well as the changing consistency of the contents during the blending process. If the constant pulsing pattern is too slow, the contents may settle relatively quickly, resulting in excessive "off" time between "on" pulses. This can lead to a total processing time longer than necessary. If the constant pulsing pattern is too fast, the contents will not be allowed to completely settle to the bottom of the reservoir, and the blending performance will consequently be poor because the blades will be unable to efficiently process and mix the contents. These conditions can also leave the ice over crushed or under crushed.

There is a need for a blender having a crushed ice functionality which can accommodate variations in the properties and quantities of the contents in order to optimize the processing and mixing of the contents.

SUMMARY OF THE INVENTION

An embodiment of the invention comprises a blender comprises a motor, a container for holding items for pro-

cessing, and a cutter assembly located within the container and operably coupled to the motor whereby the motor effects the movement of the cutter assembly. A cycle of operation for the blender comprises operating the cutter assembly at a predetermined operating speed, reducing the operating speed of the cutter assembly, and accelerating the operating speed of the cutter assembly in response to the items in the container having settled around the cutter assembly.

An alternate embodiment of the invention comprises a blender comprising a base, a motor located within the base, a container coupled to the base and adapted to hold items for processing, a cutter assembly located within the container and operably coupled to the motor, a speed sensor outputting a signal representative of the motor speed, and a controller operably coupled to the motor and the speed sensor for controlling the speed of the motor in response to the output signal of the speed sensor to implement a cycle of operation. The cycle of operation comprises the sequence of operating the cutter assembly at a predetermined operating speed, reducing the operating speed of the cutter assembly, and accelerating the operating speed of the cutter assembly in response to the items in the container having settled around the cutter assembly.

An alternate embodiment of the invention comprises a blender comprising a motor, a container for holding items for processing, and a cutter assembly located within the container and operably coupled to the motor whereby the motor effects the movement of the cutter assembly. A method of processing food items in a blender comprises operating the cutter assembly at a predetermined operating speed until at least some of the food items are suspended above the cutter assembly, reducing the operating speed of the cutter assembly to allow at least some of food items to settle around the cutter assembly, and accelerating the operating speed of the cutter assembly in response to the items in the container having settled around the cutter assembly until the food items are suspended above the cutter assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an embodiment of a blender according to the invention comprising a container and a motor-driven cutter assembly for processing food items.

FIG. **2** is a schematic view of a control system for the blender illustrated in FIG. **1**.

FIG. **3** is a perspective partial view of the blender illustrated in FIG. **1** showing food items in a settled condition in the container.

FIG. **4** is a perspective partial view of the blender illustrated in FIG. **1** showing food items in a suspended condition in the container.

FIG. **5** is a graphical representation of the speed of the motor for a no-load condition of food items in the container.

FIG. **6** is a graphical representation of the speed of the motor for a loading condition of food items in the container.

DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

Referring now to FIG. **1**, an embodiment of the invention is illustrated comprising a blender **10**. The blender **10** has standard elements common in the art, as disclosed in U.S. Pat. No. 6,092,922, which is incorporated fully herein by reference. These common elements will not be described in detail except as necessary for a full understanding of the invention.

The blender **10** comprises an open-top container **12** and a base **14**. The container **12** comprises an upwardly-extending perimeter wall **22** from which extends a handle **20** to assist a user in maneuvering the container **12** during use. A lid **18** closes the top of the container **12**. The perimeter wall **22** transitions to a downwardly-extending annular skirt **24**. Separating the perimeter wall **22** and the annular skirt **24** is a bottom wall (not shown) generally orthogonal to the axis of the perimeter wall **22** and the annular skirt **24**

The container **12** defines a chamber **16** adapted to hold a food item (FIG. **3**). A food processing assembly, e.g. a rotating cutter assembly **32**, for processing food items in the chamber **16** is mounted in an aperture in a bottom wall of the container **12** so that a first blade portion of the cutter assembly **32** extends into the chamber **16** and a second drive shaft portion of the cutter assembly **32** extends through the bottom wall of the container **12** into the interior of the annular skirt **24**. The cutter assembly **32** comprises a plurality of mixing blades to facilitate mixing, liquefying, chopping, processing, etc., of food items as the cutter assembly **32** rotates. The drive shaft portion is rotatably mounted in the bottom wall of the container **12** and is adapted for coupling with an output shaft of a drive motor (not shown) housed in the base **14**.

The base **14** comprises a base housing **26** having a control panel **28**. The base housing **26** transitions upwardly to a container pedestal **30** adapted for cooperative registry with the skirt **24** when the container **12** is seated on the base **14**. A motor **54** (FIG. **2**) is located within the base housing **26**. The motor **54** is operably coupled to the cutter assembly **32** for driving the cutter assembly **32**. This can be accomplished by the motor **54** having an output shaft that is coupled to the cutter assembly **32**. Seating of the container **12** on the container pedestal **30** will couple the output shaft of the drive motor **54** with the drive shaft portion of the cutter assembly **32**.

The control panel **28** can comprise an array of switches **34**, lights **36**, and a display panel **38** to enable a user to select an operational parameter, such as an "on" and "off" switch **48**, speed, or time, select a processing function, such as chopping, liquefying, or crushing, and/or monitor a parameter, such as a selected function, time, or speed. The control panel **28** can also comprise a switch **40** for selecting an ice crushing function according to the invention, as described more fully hereinafter.

The switches **34**, **40**, **48** can comprise toggle switches, push-button switches, membrane or tactile switches, and the like. The lights **36** can comprise incandescent bulbs, LEDs, and the like.

FIG. **2** illustrates in schematic form a control system **50** for the ice crushing function. The control system comprises a microprocessor **52** operably coupled with a well-known triac switch **56** for controlling the "on" and "off" states of the motor **54**. The motor **54** is supplied with power from a suitable power supply **60**. The speed of the motor **54** is monitored through a suitable, well-known sensor, such as a Hall effect sensor coupled with the motor **54** for determining the motor shaft speed in RPM. Alternatively, the speed of the motor **54** can be monitored through a well-known current sensor coupled with the motor power input, an optical sensor coupled with the motor shaft, or some other motor performance feedback device.

The processor **52** is adapted with a preprogrammed cycle for controlling the motor **54** through the triac switch **56** to provide a pulsed "on/off" operation of the motor **54**, as hereinafter described.

FIG. **3** illustrates the condition of the contents of the container **12** when the motor **54** is in the "off" state. For illustrative purposes, the contents are assumed to comprise a liquid fraction **42** and solid particles **44**, such as ice cubes. In the "off" state, the solid particles **44** will accumulate at the bottom of the chamber **16** around the cutter assembly **32** into a "settled" condition. Thus, when the motor **54** is triggered into the "on" state, the comminuting effect of the cutter assembly **32** on the solid particles **44** will be optimized.

FIG. **4** illustrates the condition of the contents of the container **12** when the motor **54** is in the "on" state, i.e. during a predetermined operating time period. In this condition, the solid particles **44** are suspended in the liquid fraction **42**, which is characterized by a vortex **46** caused by the spinning of the cutter assembly **32**. The vortex **46** causes the solid particles **44** to migrate away from the cutter assembly **32** and, depending in part on the relative proportion of the liquid fraction **42**, to be urged against the perimeter wall **22**, in a "suspended" condition. At some time after the initiation of the "on" state, the solid particles **44** will have migrated away from the cutter assembly **32**, which will no longer comminute the solid particles **44**. This time is equivalent to the predetermined operating time period.

FIG. **5** illustrates a no-load curve **70** for this process in which there are no contents in the container **12**, or a relatively small quantity and/or loose consistency of the contents. For illustrative purposes in FIGS. **5** and **6**, 6000 RPM represents a predetermined operating speed, and 1120 RPM represents a speed at which solid particles have accumulated into the "settled" condition, i.e. a predetermined settling speed. 0.5 second represents the predetermined operating time period, and 4 seconds represents a predetermined deceleration time period during which solid particles have accumulated into the "settled" condition.

Upon the operation of the crush ice switch **40**, the motor **54** will be accelerated **72** from the "off" state to the predetermined operating speed, such as 6000 RPM, and maintained at this speed for the predetermined operating time period, such as 0.5 second **74**. Upon the expiration of the predetermined operating time period, power to the motor **54** will be terminated by the triac switch **56** under the control of the processor **52** to deactivate the motor **54** to the "off" state, and the motor **54** will be allowed to decelerate **76** toward the predetermined settling speed, such as 1120 RPM. Since the rotation of the cutter assembly **32** will be relatively unimpeded by the contents of the container **12**, the motor speed may not reach the predetermined settling speed within the predetermined deceleration time period of 4 seconds. Upon the expiration of the predetermined deceleration time period, the triac switch **56** will deliver power to return the motor **54** to the "on" state, the motor **54** will re-accelerate **78** to the predetermined operating speed, and will be maintained at this speed **80** for the predetermined operating time period. Upon the expiration of the predetermined operating time period, the motor **54** will again be returned to the "off" state by the triac switch **56** under the control of the processor **52**, and allowed to decelerate **82** toward the predetermined settling speed, or, if the crush ice switch **40** has been actuated, toward a speed of 0 RPM. The "on/off" sequence is repeated until the user activates the crush ice switch **40** or the on/off switch **48** to terminate the operation.

At some point in the process, deceleration of the motor to the predetermined settling speed may occur prior to the expiration of the predetermined deceleration time period, as described above. In such a case, power will be restored to the motor **54** upon the motor reaching the predetermined settling speed, and the motor **54** will again accelerate to the predetermined operating speed, to repeat the "on/off" process. This condition is illustrated in FIG. **6**.

FIG. **6** illustrates a load curve at **90** for the process in which the contents of the container **12** are of a consistency that enables the motor RPM to decelerate to a speed of 1120 RPM in less than 4 seconds after termination of power to the motor **54**. Thus, upon the operation of the crush ice switch **40**, the motor **54** will be accelerated **92** from the "off" state to a predetermined operating speed of 6000 RPM, and maintained at this speed for a predetermined operating time period of 0.5 second **94**. Upon the expiration of the predetermined 0.5 second, the motor **54** will be deactivated to the "off" state, and allowed to decelerate **96** toward the predetermined settling speed of 1120 RPM. Since the rotation of the cutter assembly **32** will be relatively impeded by the contents of the container **12**, the motor speed will rotate at a speed in excess of 1120 RPM after 4 seconds has expired. Upon reaching 1120 RPM, the motor **54** will be returned to the "on" state, will reaccelerate **98** to 6000 RPM, and will be maintained at this speed **100** for 0.5 second. Again, upon the expiration of 0.5 second, the motor **54** will be deactivated to the "off" state, and allowed to decelerate **102** toward 1120 RPM. The process of acceleration **104**, maintenance of the 6000 RPM speed **106**, and deceleration **108** toward the 1120 RPM speed will be maintained until the crush ice switch **40** or the on/off switch **48** is actuated to terminate the process.

The predetermined operating speed, predetermined settling speed, predetermined operating time period, and predetermined deceleration time period are functions of the blender motor size, the cutter assembly configuration, the container size and configuration, the properties such as hardness and viscosity of the items to be processed in the blender, and the like, and are selected to optimize the effectiveness of the pulsing process. Thus, these speeds and time periods will vary for different blenders, and must be determined empirically for a particular blender. The description following will be based upon a blender having a predetermined operating speed of 6000 RPM, a predetermined settling speed of 1120 RPM, a predetermined operating time period of 0.5 seconds, and a predetermined deceleration time period of 4 seconds.

When the motor **54** is returned to the "off" state, the solid particles **44** will migrate to the bottom of the chamber **16**, to accumulate around the cutter assembly **32** in the "settled" condition. The maximum time period for this migration of solid particles **44** into the "settled" condition is equivalent to the predetermined deceleration time period. However, depending on the properties of the solid particles **44**, the cutter assembly **32**, the motor **54**, the container **12**, and other properties of the blender **10**, the settled condition may be reached prior to the expiration of the predetermined deceleration time period, as indicated by the slowing of the motor **54** to the predetermined settling speed. In either case, the motor **54** will be triggered into the "on" state when the solid particles **44** are in the "settled" condition, thereby optimizing the comminuting effect of the cutter assembly **32** on the solid particles **44**.

The feedback sensor can indicate in a well-known manner whether one of two conditions has occurred, i.e. whether the motor speed has dropped below 1120 RPM, or whether voltage to the motor has been removed for 4 consecutive seconds.

As ingredients (such as ice) settle within the chamber **16**, the load on the cutter assembly **32** will cause the motor speed to drop-off relatively rapidly. The feedback sensor **58** will sense this drop off, and will generate a proportional signal to the processor **52**, which will cause triac switch **56** to apply voltage to the motor **54** for repeating the cycle. As ingredients in the chamber **16** are comminuted and mixed, the load on the cutter assembly will drop and will trend back to the no-load condition. To end the cycling, the consumer can either switch the blender to the 'off' state, or actuate a speed switch, at which time the blender will exit the "crush ice" function to operate at the selected speed.

The "on" time, the "on" speed, and the RPM threshold have been selected in order to optimize crush ice performance and simulate a person crushing ice by cycling a pulse button. It has been found that a user will typically hold the pulse button only for a short period of time (e.g. 0.5 sec) and at a speed that will crush ice (i.e. 6000 RPM). The user will then release the pulse switch to allow the ingredients to settle back down to the bottom of the chamber **16** to start the process over.

Rather than a fixed period of time between "on" pulses, the "off" time is variable, and based on the contents of the blender. The heavier the load, the quicker the contents will settle, the quicker the cutters will slow down, and the quicker the contents will be ready to be processed again.

The motor **54** and cutter assembly **32** speed does not return all the way to 0 RPM before repeating the process, in part, because the additional time to reach 0 RPM and reaccelerate from 0 RPM to the preselected operating speed does not improve comminuting performance and only slows the entire process. 1120 RPM represents for a particular blender configuration a cutter assembly speed that slows significantly enough to allow the contents to reach the "settled" condition to be processed again.

The 0.5 sec predetermined operating time period and the 6000 RPM predetermined operating speed represent an optimization of the pulsing feature. During a pulsing operation, the crushing of ice, or any other ingredients, is primarily effective only during the beginning of the cycle. After the initial acceleration of the cutter assembly, the ingredients are tossed away from the cutter assembly and are no longer effectively comminuted and blended. 0.5 second represents a time period during which the comminuting action of the cutter assembly is optimized.

The predetermined operating speed has a similar effect. If the speed is too high, the contents are thrown away from the cutter assembly too quickly, resulting in poor comminuting and blending performance. If the speed is too low, insufficient work is performed on the contents, also resulting in poor comminuting and blending performance. 6000 RPM represents a predetermined operating speed for which the comminuting action of the cutter assembly is optimized.

The blender described herein provides a variable cycling of a crush ice pulsing pattern, which is different than the repeating time-based pulsing pattern of conventional blenders. The variable pulsing process better simulates how a user manually achieves the comminuting and blending effect when operating the on/off switch on a blender. If a user is crushing ice cubes or other solid food items by cycling a conventional pulse switch or on/off switch, they will rely on visual feedback from observing the blending operation to adjust their operation pattern. A user manually operating the pulse or on/off switch will observe the ingredients and, after sending a quick pulse to comminute the ingredients, will observe the ingredients settle back down around the cutter assembly, indicating the need for the next quick pulse. As the ingredients become processed the pulsing pattern will quicken, with shorter "off" times between the quick pulses. With the use of speed feedback between the motor/cutter assembly and the blender control system the blender can "sense" when the cutter assembly is slowing down, an indication that the ingredients are settling. Once a predetermined degree of settling has been reached, as indicated by the rotation speed of the motor/cutter assembly, the preprogrammed routine can control the next pulse burst to the motor. The speed and duration of the "on" time can be optimized for the intended blender based on container design, capacity, motor power, and cutter assembly configuration.

While the invention has been specifically described in connection with certain specific embodiments thereof, it is to be understood that this is by way of illustration and not of limitation. Reasonable variation and modification are possible within the scope of the forgoing disclosure and drawings without departing from the spirit of the invention which is defined in the appended claims.

What is claimed is:

~~**1**. A cycle of operation for a blender comprising a motor, a container for holding items for processing, and a cutter assembly located within the container and operably coupled to the motor whereby the motor effects the rotation of the cutter assembly, the cycle comprising:~~

~~automatically controlling a rotational speed of the cutter assembly to effect a pulsing of the speed of the cutter assembly wherein each pulse comprises:~~

~~(A) a constant speed phase, where the operating speed of the cutter assembly is maintained at a predetermined operating speed,~~

~~(B) a deceleration phase, where the speed of the cutter assembly is reduced from the operating speed to a predetermined settling speed indicative of the items in the container having settled around the cutter assembly, which is less than the operating speed and greater than zero, and~~

~~(C) an acceleration phase, where the speed of the cutter assembly is increased from the settling speed to the operating speed.~~

~~**2**. The cycle according to claim **1**, wherein steps A, B, and C are sequentially repeated until at least one of the cycle automatically ending and the user manually ending the cycle.~~

~~**3**. The cycle according to claim **1**, wherein step A comprises maintaining the predetermined operating speed for a predetermined operating time period.~~

~~**4**. The cycle according to claim **3**, wherein the predetermined operating speed is selected to comminute the items.~~

~~**5**. The cycle according to claim **4**, wherein the predetermined operating time period is selected to maintain contact of the cutter assembly with the items during operation of the cutter assembly at the predetermined operating speed.~~

~~**6**. The cycle according to claim **1**, wherein step B comprises continuously reducing the operating speed of the cutter assembly.~~

~~**7**. The cycle according to claim **1**, wherein step B comprises terminating power to the motor to reduce the operating speed of the cutter assembly.~~

~~**8**. The cycle according to claim **7**, wherein reducing the operating speed of the cutter assembly allows the items in the container to settle around the cutter assembly.~~

~~**9**. A method of processing food items in a blender, the blender comprising a motor, a container for holding items for processing, and a cutter assembly located within the container and operably coupled to the motor whereby the motor effects the movement of the cutter assembly, the method comprising:~~

~~automatically controlling a rotational speed of the cutter assembly to effect a pulsing of the speed of the cutter assembly wherein each pulse comprises:~~

~~(A) operating the cutter assembly in a constant speed phase, where the operating speed of the cutter assembly is maintained at a predetermined operating speed until at least some of the food items are suspended above the cutter assembly;~~

~~(B) reducing the operating speed of the cutter assembly during a deceleration phase, where the speed of the cutter assembly is reduced from the operating speed to a predetermined settling speed to allow at least some of the food items to settle around the cutter assembly, wherein the settling speed is less than the operating speed and greater than zero; and~~

~~(C) accelerating the operating speed of the cutter assembly during acceleration phase, where the speed of the cutter assembly is increased from the settling speed to the operating speed until the food items are suspended above the cutter assembly.~~

~~**10**. The method according to claim **9**, wherein steps A, B, and C are sequentially repeated until at least one of the cycle automatically ending and the user manually ending the cycle.~~

~~**11**. The method according to claim **9**, wherein step A comprises maintaining the predetermined operating speed for a predetermined operating time period.~~

~~**12**. The method according to claim **11**, wherein the predetermined operating speed is selected to comminute the items.~~

~~**13**. The method according to claim **12**, wherein the predetermined operating time period is selected to maintain contact of the cutter assembly with the items during operation of the cutter assembly at the predetermined operating speed.~~

~~**14**. The method according to claim **12**, wherein the predetermined operating time period is selected to operate the cutter assembly until the food items are suspended above the cutter assembly.~~

~~**15**. The method according to claim **9**, wherein step B comprises continuously reducing the operating speed of the cutter assembly.~~

~~**16**. The method according to claim **9**, wherein step B comprises terminating power to the motor to reduce the operating speed of the cutter assembly.~~

17. A cycle of operation for a blender comprising a motor, a container for holding items for processing, a cutter assembly located within the container and operably coupled to the motor whereby the motor effects the rotation of the cutter assembly, and a sensor for monitoring a speed of the cutter assembly, the cycle comprising:

automatically controlling a rotational speed of the cutter assembly to effect a sequencing of the speed of the cutter assembly based on monitoring the speed of the cutter assembly with the sensor, wherein each sequence comprises:

(A) a constant speed phase, where the operating speed of the cutter assembly is maintained at a predetermined operating speed,

(B) a deceleration phase, where the speed of the cutter assembly is reduced from the operating speed to a predetermined settling speed indicative of the items

in the container having settled around the cutter assembly, which is less than the operating speed and greater than zero, and

(C) an acceleration phase, where the speed of the cutter assembly is increased from the settling speed to the operating speed in response to the sensor sensing that the speed of the cutter assembly has reduced to the predetermined settling speed.

18. The cycle according to claim 17, wherein steps A, B, and C are sequentially repeated until at least one of the cycle automatically ending and the user manually ending the cycle.

19. The cycle according to claim 17, wherein step A comprises maintaining the predetermined operating speed for a predetermined operating time period.

20. The cycle according to claim 19, wherein the predetermined operating speed is selected to comminute the items.

21. The cycle according to claim 20, wherein the predetermined operating time period is selected to maintain contact of the cutter assembly with the items during operation of the cutter assembly at the predetermined operating speed.

22. The cycle according to claim 17, wherein step B comprises continuously reducing the operating speed of the cutter assembly.

23. The cycle according to claim 17, wherein step B comprises terminating power to the motor to reduce the operating speed of the cutter assembly.

24. The cycle according to claim 23, wherein reducing the operating speed of the cutter assembly allows the items in the container to settle around the cutter assembly.

25. A method of processing food items in a blender, the blender comprising a motor, a container for holding items for processing, a cutter assembly located within the container and operably coupled to the motor whereby the motor effects the movement of the cutter assembly, and a sensor for monitoring a speed of the cutter assembly, the method comprising:

automatically controlling a rotational speed of the cutter assembly to effect a sequencing of the speed of the cutter assembly based on monitoring the speed of the cutter assembly with the sensor, wherein each sequence comprises:

(A) operating the cutter assembly in a constant speed phase, where the operating speed of the cutter assembly is maintained at a predetermined operating speed until at least some of the food items are suspended above the cutter assembly;

(B) reducing the operating speed of the cutter assembly during a deceleration phase, where the speed of the cutter assembly is reduced from the operating speed to a predetermined settling speed to allow at least some of the food items to settle around the cutter assembly, wherein the settling speed is less than the operating speed and greater than zero; and

(C) in response to the sensor sensing that the speed of the cutter assembly has reduced to the predetermined settling speed, accelerating the operating speed of the cutter assembly during an acceleration phase, where the speed of the cutter assembly is increased from the settling speed to the operating speed until the food items are suspended above the cutter assembly.

26. The method according to claim 25, wherein steps A, B, and C are sequentially repeated until at least one of the cycle automatically ending and the user manually ending the cycle.

27. The method according to claim 25, wherein step A comprises maintaining the predetermined operating speed for a predetermined operating time period.

28. The method according to claim 27, wherein the predetermined operating speed is selected to comminute the items.

29. The method according to claim 28, wherein the predetermined operating time period is selected to maintain contact of the cutter assembly with the items during operation of the cutter assembly at the predetermined operating speed.

30. The method according to claim 28, wherein the predetermined operating time period is selected to operate the cutter assembly until the food items are suspended above the cutter assembly.

31. The method according to claim 25, wherein step B comprises continuously reducing the operating speed of the cutter assembly.

32. The method according to claim 25, wherein step B comprises terminating power to the motor to reduce the operating speed of the cutter assembly.

33. The cycle according to claim 17, wherein the deceleration phase comprises reducing the operating speed of the cutter assembly based on properties of the items in the blender.

34. The cycle according to claim 17, wherein the sensor is a current sensor, a Hall effect sensor, or an optical sensor.

35. The cycle according to claim 17, wherein the sensor senses that the speed of the cutter assembly has reduced from the operating speed to the predetermined settling speed and sends a proportional signal to a processor that causes a switch to apply voltage to the motor for accelerating the operating speed of the cutter assembly.

36. The cycle according to claim 23, wherein the acceleration phase comprises resupplying power to the motor in response to the sensor sensing that the speed of the cutter assembly has reduced to the predetermined settling speed.

37. The cycle according to claim 17, wherein at least one sequence comprises accelerating the speed of the cutter assembly to the operating speed in response to a determination that a predefined duration of deceleration has expired prior to the speed of the cutter assembly reducing to the predetermined settling speed.

38. The cycle according to claim 17, wherein a duration of the deceleration phase is based on properties of the items in the blender.

39. The method according to claim 25, wherein step B comprises reducing the operating speed of the cutter assembly based on properties of the food items in the blender.

40. The method according to claim 25, wherein the sensor is a current sensor, a Hall effect sensor, or an optical sensor.

41. The method according to claim 25, wherein the sensor senses that the speed of the cutter assembly has reduced from the operating speed to the predetermined settling speed and sends a proportional signal to a processor that causes a switch to apply voltage to the motor for accelerating the operating speed of the cutter assembly.

42. The method according to claim 32, wherein step C comprises resupplying power to the motor in response to the sensor sensing that the speed of the cutter assembly has reduced to the predetermined settling speed.

43. The method according to claim 25, wherein at least one sequence comprises accelerating the speed of the cutter assembly to the operating speed in response to a determination that a predefined duration of deceleration has expired prior to the speed of the cutter assembly reducing to the predetermined settling speed.

44. The method according to claim 25, wherein a duration of the deceleration phase is based on properties of the items in the blender.

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