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GB 2479217 A **EP 2625992 A1**
EP 0382092 A1

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Other: **WPI, EPODOC, Internet**

(54) Title of the Invention: **Hand blender**
Abstract Title: **Hand held food processor having a planetary drive**

(57) A hand held food processor utensil 100 comprises a processor housing 112 that defines a processing space 115. A first rotary tool 107 is arranged to rotate within the processing space about a tool axis B-B. The tool axis is itself arranged to rotate about an axially extending housing axis A-A, wherein the housing axis is offset from the tool axis. The utensil may comprise a drive shaft 101 which extends along the housing axis and which is arranged to drive a carrier member 103 member about the housing. The first rotary tool may be rotatably mounted to the carrier member. The carrier member may comprise a plate that defines an upper end of the processing space and there may be a seal 106 around the periphery of the carrier member. The tool may be mounted on a tool shaft 114 which can be driven by a planet gear 104 meshing with a sun gear provided on the drive shaft and with a stationary outer gear ring 105. The utensil may further comprise a secondary rotary tool that has a different tool axis, a different axial level and rotates at a different speed to the first tool.

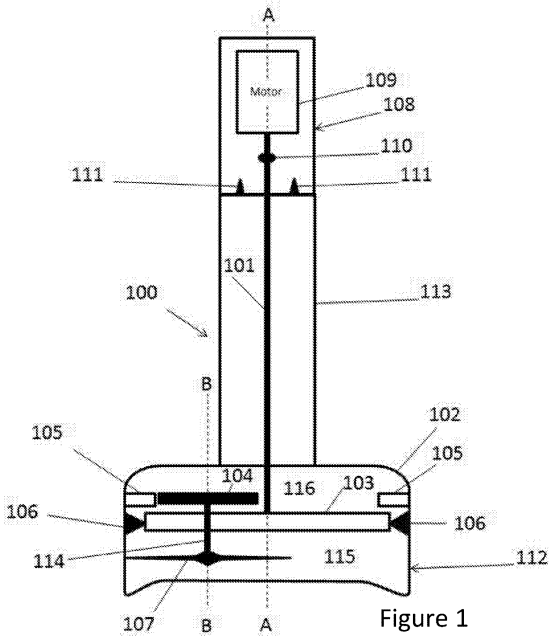

Figure 1

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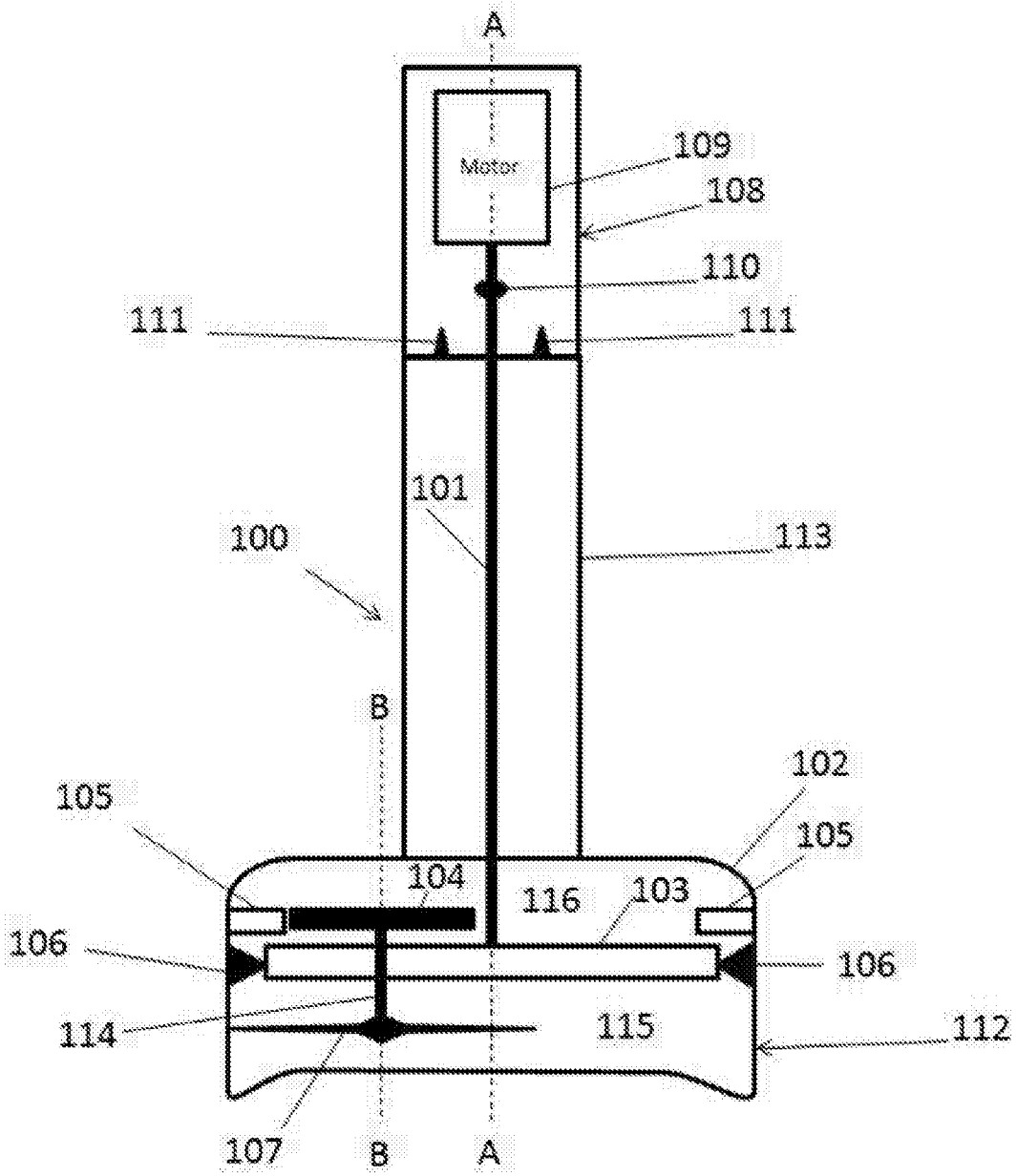
A
Motor
109
108
110
111
111
101
100
113
B
102
105
105
104
116
103
106
106
114
115
112
107
B
A

Figure 1

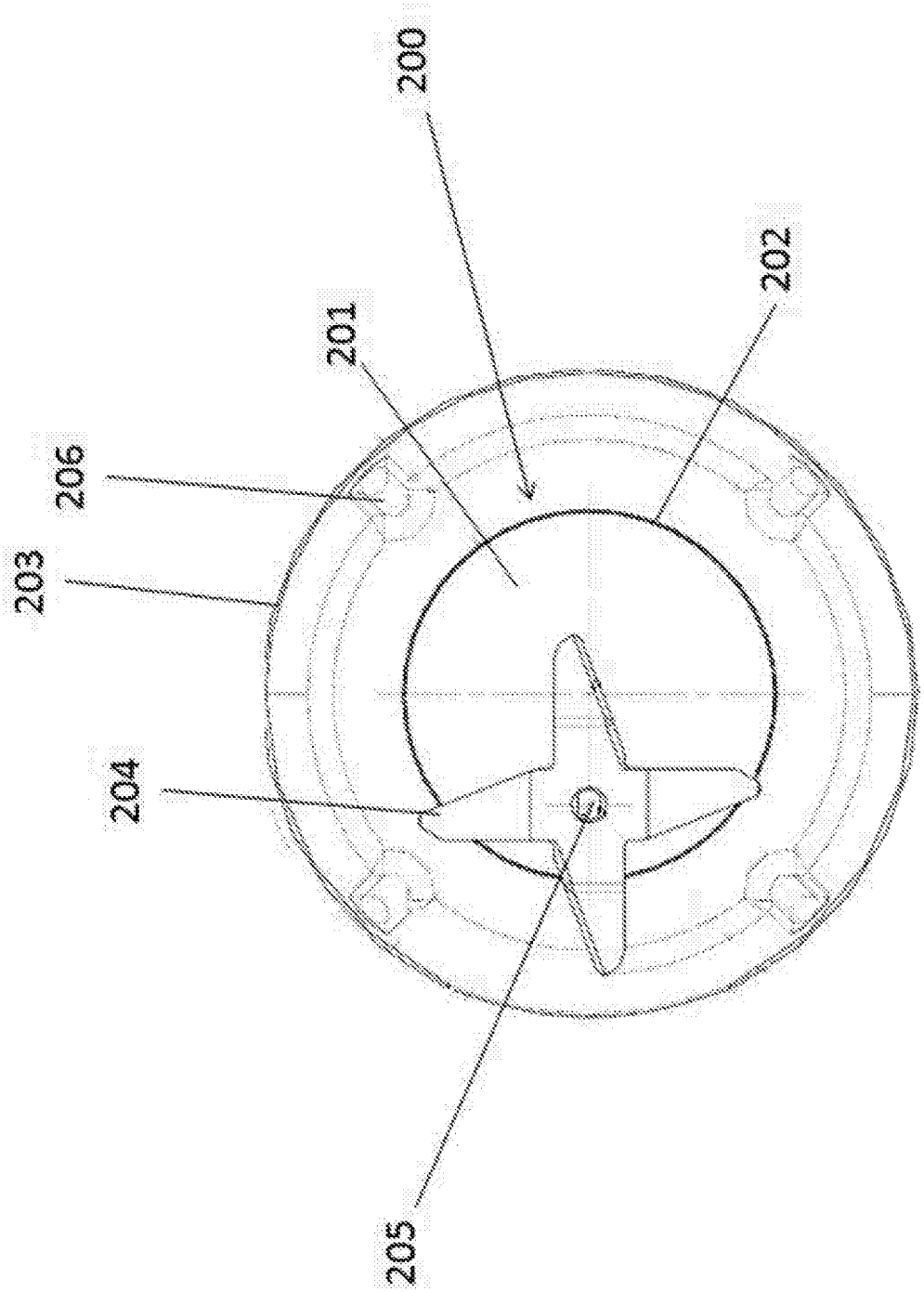

Figure 2

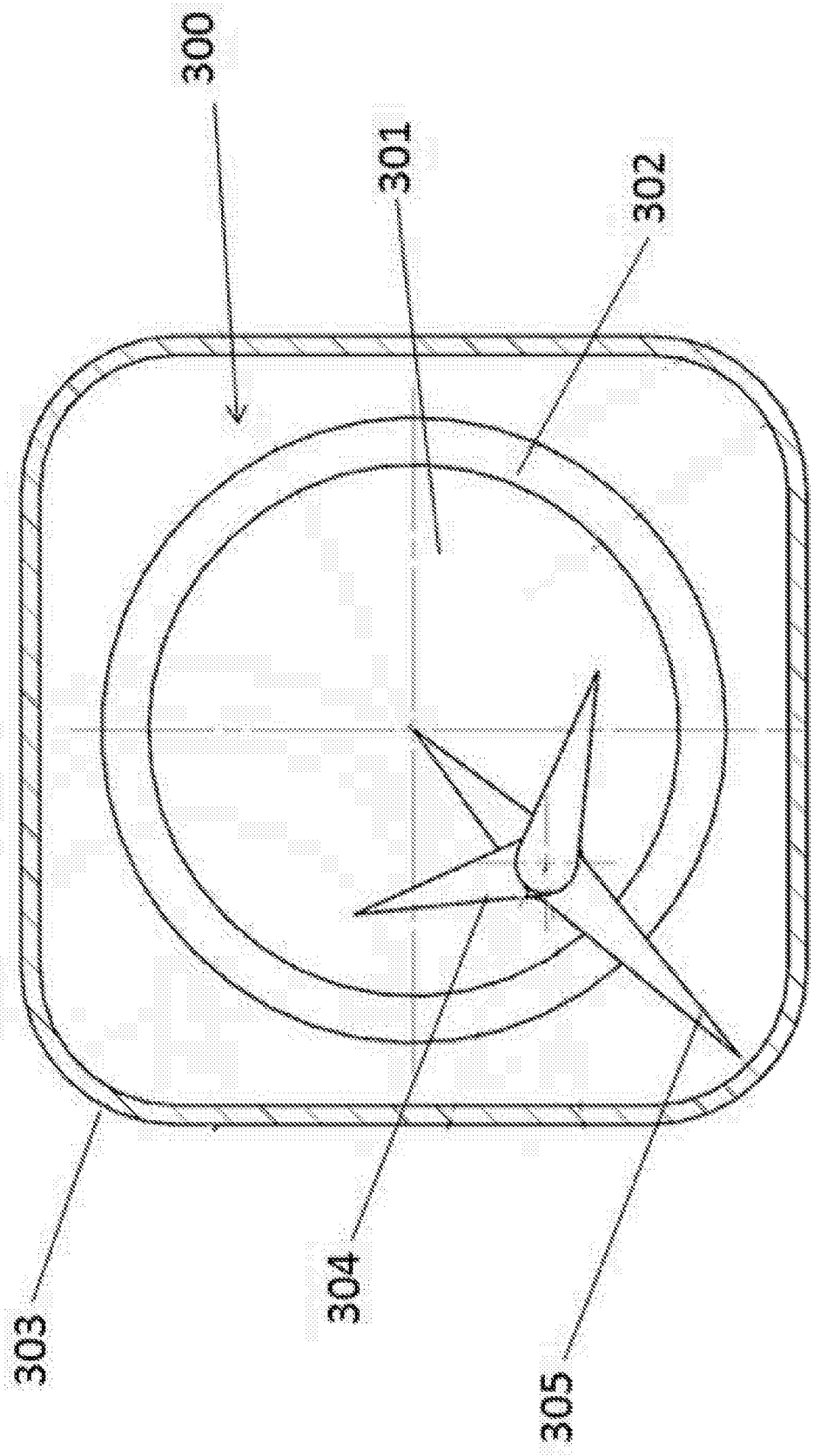

Figure 3

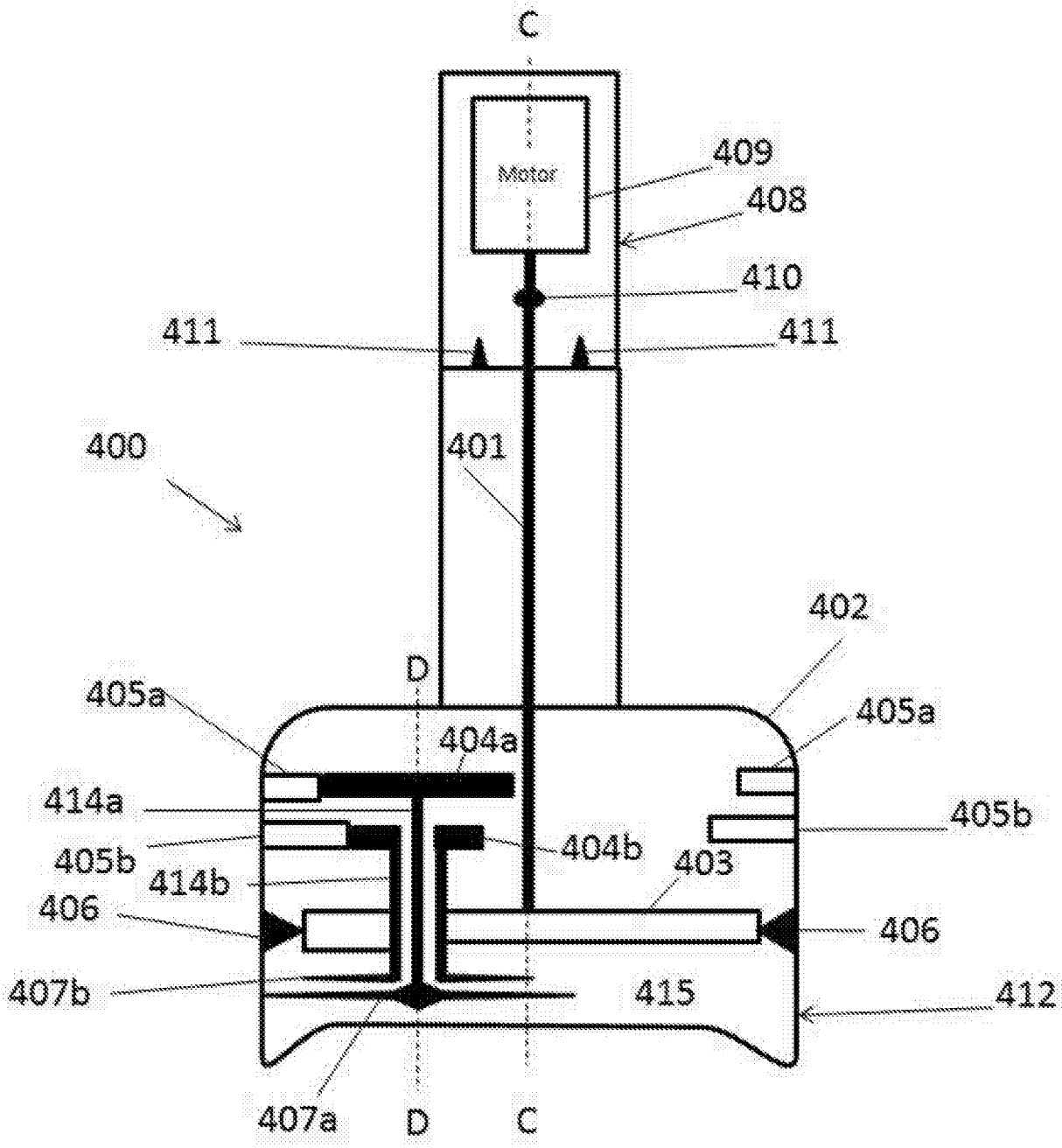
C
Motor
409
408
410
411
411
400
401
402
D
405a
405a
404a
414a
405b
405b
404b
403
414b
406
406
407b
415
412
407a
D
C

Figure 4

HAND HELD FOOD PROCESSOR

Field

The present invention relates to hand held food processors such as hand blenders for use as a kitchen appliance, and tool or blade arrangements for such devices.

Background

A hand blender is a hand-held or hand-holdable tool for carrying out the cutting, mashing, blending, or otherwise processing of a working medium, typically food.

Hand blenders typically include a blending housing defining a cup-like area, open at a lower end through which food may enter the housing, in which blending is performed by a rotary bladed tool. The housing generally has an axially extending handle or wand which is attached or attachable to a hand grippable portion containing a motor.

These blending housings are typically cylindrical or frusto-conical in shape and the rotary bladed tool rotates concentrically to the blending housing. This results in a problem that whilst the velocity of the tips of the blades of the rotary tool is relatively high, that near the central axis of rotation of the rotary tool is low. Material at or directly below a central boss of the rotary tool may remain relatively unprocessed.

Where a non-cylindrical or frusto-conically-shaped blending housing has be tried (e.g., one that is square in profile when seen from below), a rotary bladed tool will leave dead-zones in which food within the blending housing remains unprocessed near the corners of the blending housing. This is undesirable.

The present invention is directed to at least partially ameliorating the above-described problems.

Summary of Invention

The invention provides a utensil for a hand held food processor having a planetary drive. Thus the utensil has a rotary tool arranged to rotate about both a tool axis and a drive

axis which is offset from the tool axis. Thus the tool moves around bodily in the food being processed so as to achieve better mixing.

According to a first aspect of the invention, there is provided a hand held food processor utensil comprising a processor housing defining a processing space, and a first rotary tool arranged to rotate within the space for processing food, in which the tool is arranged to rotate about a tool axis, and in which the tool axis is arranged to rotate about a substantially axially extending housing axis, the housing axis being offset from the tool axis. The presence and volume of dead zones may thereby be reduced, even if the housing is non-circular in cross-section.

The processor utensil may comprise a drive shaft for providing drive to the first rotary tool, extending along the housing axis. The drive shaft may be arranged to drive a carrier member about the housing axis, the first rotary tool being rotatably mounted to the carrier member. The carrier member may for example comprise a circular plate defining an upper end of the processing space, and may further comprise a seal around the periphery of the carrier member for sealing with the housing to help prevent leakage into a space above the carrier member.

The first rotary tool may be mounted on a tool shaft extending through the carrier member and offset from the drive shaft, wherein the tool shaft may be arranged to be driven by the drive shaft by a gear system. Such drive can be provided by a planet gear meshing with a sun gear provided on the drive shaft, and with a stationary outer gear ring which may be mounted to the housing.

The tool may be a blending tool comprising a plurality of blades which may be arranged to extend outwardly of the tool axis, optionally at different angles. The blades may be of different lengths. The rotary tool axis may be inclined relative to the housing axis to mitigate collection of material above the blades.

At least a portion of the housing may be non circular or substantially square in cross section. In this case, the rotary tool may comprise at least one blade which extends from the shaft further than the minimum distance between the tool shaft and the housing. Thus, upon rotation, such a blade may more closely approach the housing wall further from the axis to reduce dead zones in such regions, eg the corners of a square housing.

There may also be provided a second rotary tool, to provide a more thorough processing of materials. The second tool may be mounted on the same tool axis, or may have a tool axis different from that of the first tool, and may further be mounted in the processing space at the same or a different axial level from the first tool. The second tool can be arranged to rotate in an opposite direction and/or at a different speed from the first tool, so as to carry out different tasks or provide a shearing effect.

For ease of use, the processor utensil may comprise an elongate handle extending axially from the housing, along which the drive shaft may extend. The handle may be attached to a hand grippable motor housing to form a hand held processor, the motor housing having a drive outlet arranged to provide rotary drive to the drive shaft. The motor housing may further be detachable from the processor utensil to facilitate cleaning and/or repair, or use with other devices.

An inner surface of the housing may comprise at least one discontinuity such as a protrusion extending into the processing space to disturb the flow and help avoid the creation of vortices during processing. A lower end of the housing may be substantially open to allow material being processed to flow into and out of the housing, and a lower edge of the housing surrounding the opening may having undulations or castellations.

The invention extends to a hand-tool substantially as described herein with reference to the drawings.

The invention also encompasses a kit of parts for constructing any of the apparatuses or apparatus elements herein described.

Any apparatus feature as described herein may also be provided as a method feature, and vice versa. As used herein, means plus function features may be expressed alternatively in terms of their corresponding structure, such as a suitably programmed processor and associated memory.

Any feature in one aspect of the invention may be applied to other aspects of the invention, in any appropriate combination. In particular, method aspects may be applied to apparatus aspects, and vice versa. Furthermore, any, some and/or all features in one

aspect can be applied to any, some and/or all features in any other aspect, in any appropriate combination.

It should also be appreciated that particular combinations of the various features described and defined in any aspects of the invention can be implemented and/or supplied and/or used independently.

In this specification the word 'or' can be interpreted in the exclusive or inclusive sense unless stated otherwise.

Furthermore, features implemented in hardware may generally be implemented in software, and vice versa. Any reference to software and hardware features herein should be construed accordingly.

Whilst the invention has been described in the field of domestic food processing and preparation machines, it can also be implemented in any field of use where efficient, effective and convenient preparation and/or processing of material is desired, either on an industrial scale and/or in small amounts. The field of use includes the preparation and/or processing of: chemicals; pharmaceuticals; paints; building materials; clothing materials; agricultural and/or veterinary feeds and/or treatments, including fertilisers, grain and other agricultural and/or veterinary products; oils; fuels; dyes; cosmetics; plastics; tars; finishes; waxes; varnishes; beverages; medical and/or biological research materials; solders; alloys; effluent; and/or other substances, and any reference to “food” herein may be replaced by such working mediums. It will be appreciated that the processing of food may include the processing and/or blending of liquid, and may also include the processing of solid food or ice into a liquid form.

The invention described here may be used in any kitchen appliance and/or as a stand-alone device. This includes any domestic food-processing and/or preparation machine, including both top-driven machines (e.g. stand-mixers) and bottom-driven machines (e.g. blenders). It may be implemented in heated and/or cooled machines. It may be used in a machine that is built-in to a work-top or work surface, or in a stand-alone device. The invention can also be provided as a stand-alone device, whether motor-driven or manually powered.

Brief Description of Drawings

One or more aspects will now be described, by way of example only and with reference to the accompanying drawings having like-reference numerals, in which:

Fig. 1 shows a side-on cutaway schematic drawing of a hand blender according to an embodiment of the invention;

Fig. 2 shows a view of a hand blender blending housing viewed from below according to a second embodiment of the invention;

Fig. 3 shows a view of a hand blender housing according to a third embodiment viewed from below; and

Fig. 4 shows a side-on cutaway schematic drawing of a hand blender according to a fourth embodiment.

Specific Description

Hand blender wand

Fig. 1 illustrates and hand-blender wand 100, the wand 100 having a conical or cylindrical blending housing 112 with a side wall 102 which opens towards its lower end, and a cylindrical drive-shaft housing 113 concentrically connected to the upper end of the blending housing 112. The drive-shaft housing 113 surrounds a drive shaft 101 concentric to the drive-shaft housing 113 which extends into the blending housing 112.

Drive shaft 101 is connected to the carrier wheel 103 such that, when the drive shaft 101 rotates about its central axis, the carrier wheel 103 is driven to rotate concentrically with the drive shaft 101 about the driveshaft axis marked A-A in Fig. 1. Carrier wheel 103 contacts the seal 106 about its periphery, thus preventing working medium being processed by hand blender wand 100 from entering the space above carrier wheel 103, whilst permitting rotation of the carrier wheel 103. Seal 106 may be a lips seal comprising one or more flexible lips that contact the carrier wheel. Alternatively the seal 106 may be a labyrinth seal formed by intermeshing protrusions of the seal 106 and the

carrier wheel 103. The seal 106 may be a separate component or it may be integrally formed with the blending housing 112 and/or the carrier wheel 103.

The carrier wheel 103, the seal 106, and the blending housing 112 co-operatively define a blending space 115 below the carrier wheel 103 in which blending of working medium takes place. Whilst the blending housing 112 is shown as being straight-sided below carrier wheel 103, it may instead expand outwardly by, e.g., being inclined away from axis A-A, to provide a larger blending space 115.

Planet gear 104 is connected to the carrier wheel 103 by the planet axle 114, which extends through the carrier wheel 103 along an axis (the tool axis marked B-B in Fig. 1) offset from, but parallel to, axis A-A such that the planet gear 104 and the planet axle 114 can rotate together relative to the carrier wheel 103. At the opposite end of the planet axle 114 to that which is connected to planet gear 104, planet axle 114 is connected to rotary tool 107 such that when planet gear 104 is driven to rotate, this rotary force is communicated through planet axle 114 to rotary tool 107 to drive it to rotate.

Planet gear 104 contacts with a ring gear 105 which extends inwardly from, and concentrically about, a side-wall of the blending housing 112. When drive shaft 101 drives carrier wheel 103 to rotate about their common central axis A-A, planet wheel 104 is carried bodily around the axis A-A by carrier wheel 103. As planet gear 104 is in contact with ring gear 105 when this occurs, the rotation of carrier wheel 103 around axis A-A also causes planet gear 104 to rotate to rotate about axis B-B as it moves along the ring gear 105. In this way, the bladed tool 107 is driven to rotate about axis B-B at the same time as it is carried bodily by carrier wheel 103 about axis A-A.

The simultaneous movement of bladed tool 107 about axis A-A as its blade or blades rotate about axis B-B means that working medium being processed by the hand-blender wand is continually brought into contact with the tips of the blade or blades of the bladed tool 107. No dead-zone is created beneath the planet axle 114 as it is continually carried about axis A-A by the rotation of the carrier wheel 103.

Bladed tool 107 preferably comprises at least one blade of sufficient length that the rotation of bladed tool 107 about axis B-B causes the blade to sweep across axis A-A.

This prevents a dead-zone forming beneath the carrier wheel 103 along axis A-A. The blade or blades of bladed tool 107 also preferably extend close to the inner wall of blending housing 112, leaving only enough clearance as is necessary to prevent scratching of the inner wall of the blending housing 112.

Whilst axis B-B is shown as being parallel to axis A-A, it may be inclined relative to it so that, as the bladed tool 107 rotates, its blades comes closer to carrier wheel 103 along part of their rotation to "scrape" that portion by coming close to it. For example, axis B-B may be angled such that the blades of bladed tool 107 scrape the area directly below the seal 106 within the blending space 115.

The blades of bladed tool 107 are shown as extending perpendicularly to axis B-B, but them may extend at other angles. Where the bladed tool 107 comprises multiple blades some of these may be angled upwardly, towards the carrier wheel 103, and others downwardly away from the carrier wheel 103, thus ensuring a greater volume of material is processed.

Whilst only one bladed tool 107 is shown in Fig.1, the blending wand 100 may comprise multiple bladed tools 107, each receiving rotary drive via a respective planet axle 114 from a respective planet gear 104 contacting the ring gear 105. Where there is more than one bladed tool 107, their respective planet axles 114 may extend different lengths into blending space 115, resulting in the bladed tools 107 performing blending at different distances from the carrier wheel 103 within the blending space 115, and also preventing them clashing. Where there is more than one bladed tool 107 located at substantially the same distance from the carrier wheel 103, their gearing should be synchronised such that when the blades of one bladed tool 107 are sweeping across axis A-A, the blades of the other bladed tools 107 should be sufficiently far away from axis A-A to prevent clashing.

Having multiple planet gears 104, planet axles 114, and bladed tools 107 has the advantage of balancing the arrangement to avoid or diminish centrifugal forces acting on the wand 100 during operation due to uneven distribution of weight on the rotating carrier wheel 103. However, a similar advantage may be achieved by simply providing a counter-weight on the carrier wheel 103 located so as to balance the distribution of

weight on the carrier wheel 103, which may be integrally formed with the carrier wheel 103 or a separate component.

Multiple bladed tools 107 may be provided on the same planet axle 114. Where multiple blade tools 107 are provided on the same planet axle 114 they may be provided at different distances from the carrier wheel 103.

Blending wand 100 is removably attachable to a hand-grippable motor housing 108 by releasable attachment means 111. Motor housing 108 houses a motor 109, the drive outlet of which, when the motor housing 108 is attached to the blending wand 100, engages with the driveshaft 101 via the clutch 110 to impart rotary drive to it. Alternatively, the blending wand 100 may be integrally formed with motor housing 108, in which case the releasable attachment means 111 and the clutch 110 may be omitted.

Motor housing 108 may additionally comprise suitable controls and a user interface for communication with the user. A controllable gear box may also be contained within motor housing 408 to permit suitable stepping-up and stepping-down of rotary impetus to be communicated by motor 409 to drive shaft 401.

Whilst the planet gear 104 is shown as being provided within a gearing space 116 above the carrier wheel 103 on the opposite side of the carrier wheel 103 from blending space 115, co-operatively defined by the carrier wheel 103, the side wall 102, and the seal 106, other arrangements are possible. For example, the planet gear 104 may be contained within a chamber within the carrier wheel 103 and protrude through an opening in the edge of the carrier wheel 103 to engage with the ring gear 105. In this arrangement seals 106 are located above and below the opening in the edge of the carrier wheel 103 to prevent ingress of material into the chamber housing the carrier wheel 103.

The carrier wheel 103 may have through-holes defined through it to permit material (e.g., mashed potato) to be pressed through it by the bladed tool 107 (e.g., configured as a pallet for pressing material through the through holes)) and extruded through the top of the carrier wheel 103 to ensure thorough mashing. Where the carrier wheel 103 has such through-holes, the wall 102 of the blending housing 112 should also have through-holes defined in it to permit mashed material to leave the blending housing 112.

Cylindrical blending housing

Fig. 2 illustrates one possible shape for a blending space 200 of a blending wand 100 according to the present invention. In this example the blending space 200 is substantially cylindrical or frusto-conical, being co-operatively defined by a cylindrical or frusto-conical blending housing wall 203 (similar to blending housing 112), a circular carrier wheel 201 (similar to carrier wheel 103), and a seal 202 (similar to seal 106) formed between the blending housing 203 and the carrier wheel 201. Carrier wheel 201 is driven to rotate about its centre, and bladed tool 205 (similar to bladed tool 107) is carried bodily around the centre of carrier wheel 201 whilst also being driven to rotate about its own centre 205, by a similar mechanism as shown in Fig. 1.

One or more ribs 206 may be provided extending substantially from, or from a point near to, a roof of the blending housing 203 towards an opening of the blending housing. The end of the blending housing 203 near to the opening may be castellated. The advantages of such ribs and castellations is described in the applicants granted UK patent no. 2469639, the whole disclosure of which is hereby incorporated by reference.

Square blending housing

Fig. 3 illustrates another possible shape for a blending space 300 for a blending wand 100 according to the present invention. This arrangement is broadly similar to that of Fig. 2 except that the blending space 300 defined by the carrier wheel 301, seal 302, and blending housing 303 is substantially cubic or cuboid in shape. This aids storage whilst maximising the area used, and also caters to aesthetic preferences for square/cube/cuboid-shaped kitchen appliances.

To avoid the corners of the blending space 300 becoming dead-zones or food traps, the bladed tool 304 has a relatively long blade 305 of sufficient length to reach into these corners. The gearing of the arrangement is synchronised such that, for each rotation of the carrier wheel 301, the long blade 305 only extends outwards from the centre of the carrier wheel 301 when the long blade 305 is close to the corners of the blending space 300.

A blending space with any number of corners, including two corners (oval-shaped), three corners (prism-shaped), and five corners (pentagrammic prism) may similarly be provided.

Concentrically-rotating bladed tools

Fig. 4 illustrates an alternative configuration for a blending wand 400 to the blending wand 100 shown in Fig.1. The drive shaft 401, motor housing 408, motor 409, clutch 410, and attachment means 411 operate in similar fashion to the corresponding parts found in Fig.1. By contrast instead of only one planet gear being carried on planet wheel 403, two planet wheels 404a and 404b are provided concentrically at different distances from the carrier wheel 403 along tool axis D-D.

Planet wheels 404a and 404b ae of differing size, and contact their respective ring gears 405a and 405b at different distances from the tool axis D-D, resulting in planet wheels 404a and 404b experiencing different speeds of rotation when carrier wheel 403 rotates about its central axis C-C. Planet wheels 404a and 404b are connected to respective planet axles 414a and 414b (one of which wraps around the other in a manner that permits relative rotation), which in turn are connected to respective bladed tools 407a and 407b. The different speeds of rotation of planet wheels 404a and 404b are thus communicated to their respective bladed tools 407a and 407b resulting in them rotating at different speeds, and with differing torque.

This above-described arrangement is useful because it allows the bladed tools 407a and 407b to carry out differing tasks within the blending space 415 co-operatively defined by the carrier wheel 403, the seal 406, and the side wall 402 of the blending housing 412. For example, one of the bladed tools 407a and 407b may conduct low-speed, high-torque chopping, whilst the other carries out higher-speed but possibly lower-torque blending/ In another example, one tool (e.g., 407a) may carry out high-speed blending whilst the other tool (e.g., 407b) carries out low-speed mashing and extrusion of mashed material through through-holes in carrier wheel 403 as previously described of material already blended the other bladed tool. Where the bladed tools 407a and 407b are located close together along axis D-D, such that their blades come near to each other (e.g., 5mm or less) a sheering effect may result from the differing velocity.

In a further alternative, an idler wheel may be provided between one of the planet gears 404a and 404b and its respective ring gear 405a and 405b. This will result in planet gears 404a and 404b rotating in opposing directions, and thus bladed tools 407a and 407b rotating in opposite directions. Where the blades of the bladed tools 407a and 407b come near to each other, a high shearing effect may result.

The blades of the bladed tools 407a and 407b may be of differing lengths and extend at differing angles relative to axis D-D, to ensure thorough processing of food or other working medium within the blending space 415.

The hand grippable motor housing 108 may be a hand-mixer-type hand-held tool (i.e., a hand-tool typically having a horizontally-oriented handle, one or more control-interfaces, and one or more typically downwardly-facing drive-outlets which shanked tools such as whisks may attach to to receive rotary drive) in which case the releasable attachment means 111 will attach to the casing of the hand-mixer to prevent relative rotation therebetween, and the clutch 110 will connect to one of the one or more drive outlets. Where more than one drive outlet is provided on the hand-mixer, a further gearbox may be provided between the clutch 110 and the drive outlets, capable of receiving rotary drive from two or more of the drive outlets and transmitting that drive impetus (converted via e.g. idler gears to drive in the same direction where the drive outlets drive in different directions), to the clutch 110. The housing surrounding the blending space 115 may be omitted in this situation.

It will be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

Each feature disclosed in the description, and (where appropriate) the claims and drawings may be provided independently or in any appropriate combination.

Reference numerals appearing in the claims are by way of illustration only and shall have no limiting effect on the scope of the claims.

CLAIMS:

1. A hand held food processor utensil comprising a processor housing defining a processing space, and a first rotary tool arranged to rotate within the space to process the food, in which the tool is arranged to rotate about a tool axis, and in which the tool axis is arranged to rotate about a substantially axially extending housing axis, the housing axis being offset from the tool axis.

2. A processor utensil according to claim 1, comprising a drive shaft extending along the housing axis.

3. A processor utensil according to claim 2, in which the drive shaft is arranged to drive a carrier member about the housing axis, the first rotary tool being rotatably mounted to the carrier member.

4. A processor utensil as claimed in claim 3, in which the carrier member comprises a plate defining an upper end of the processing space.

5. A processor utensil as claimed in claim 4, comprising a seal around the periphery of the carrier member for sealing with the housing.

6. A processor utensil according to any preceding claim, in which the first rotary tool is mounted on a tool shaft extending through the carrier member and offset from the drive shaft.

7. A processor utensil according to claim 6, in which the tool shaft is arranged to be driven by the drive shaft.

8. A processor utensil according to claim 7, in which the tool shaft is driven by a planet gear meshing with a sun gear provided on the drive shaft, and with a stationary outer gear ring.

9. A processor utensil according to any preceding claim, in which the tool comprises a plurality of blades.

10. A processor utensil according to claim 9, in which a plurality of blades extend outwardly of the tool axis at different angles.

11. A processor utensil according to claim 9 or 10, in which a plurality of blades extend outwardly of the tool axis, and are of different lengths.

12. A processor utensil according to any preceding claim, in which the rotary tool axis is inclined relative to the housing axis.

13. A processor utensil according to any preceding claim, in which at least a portion of the housing is non circular in cross section.

14. A processor utensil according to claim 13, in which at least a lower portion of the housing is substantially square in cross section.

15. A processor utensil according to claim 14, in which the rotary tool comprises at least one blade which extends from the shaft further than the minimum distance between the tool shaft and the housing.

16. A processor utensil according to any preceding claim, comprising a second rotary tool.

17. A processor utensil according to claim 16, in which the second tool has a tool axis different from that of the first tool.

18. A processor utensil according to claim 16 or 17, in which the second tool is mounted in the processing space at a different axial level from the first tool.

19. A processor utensil according to claim 16, 17 or 18, in which the second tool rotates in an opposite direction from the first tool.

20. A processor utensil according to any of claims 16 to 19, in which the second tool is arranged to rotate at a different speed from the first tool.

21. A processor utensil according to any preceding claim, comprising an elongate

handle extending axially from the housing.

22. A processor utensil according to claim 21, in which the drive shaft extends along the handle.

23. A processor utensil according to any preceding claim, in which an inner surface of the housing comprises at least one discontinuity extending into the processing space.

24. A processor utensil according to any preceding claim, in which the housing has at least one aperture arranged to allow food to be processed to enter and exit the housing during processing.

25. A processor utensil according to claim 24, in which a lower end of the housing opposite the carrier member is substantially open.

26. A processor utensil according to any preceding claim, in which a lower edge of the housing surrounding the opening is not level so as to provide at least one aperture for the passage of food.

27. A processor utensil according to any preceding claim, in which the rotary tool comprises a blending tool.

28. A hand held food processor comprising a utensil according to any preceding claim, and a hand grippable motor housing mounted to the utensil, the motor housing having a drive outlet arranged to provide rotary drive to the tool.

29. A processor according to claim 28, in which the motor housing is detachable from the utensil.

30. A processor substantially as herein described in relation to the accompanying Figures.

Intellectual Property Office

Application No:	GB1701716.1	**Examiner:**	Miss Cassandra Fraser
Claims searched:	1-30	**Date of search:**	14 June 2017

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 2, 9, 13, 14, 16-22, 24-29	GB 2479217 A (ERNA MAS MAKINE TICARET VE SANAYI ANONIM SIRKETI). See figures (particularly figures 4 and 5) and page 1 lines 20-32, page 2 lines 5-6 and page 3 lines 13-28 of the description.
X	1-3, 16, 17, 21, 22, 24, 25, 28, 29	EP 0382092 A1 (MOULINEX SA). See WPI abstract (AN: 1990-248054), figures and translated description.
A	-	EP 2625992 A1 (KONINKL PHILIPS ELECTRONICS NV). See figures and paragraphs [0032], [0041] and [0042] of the description.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

A47J

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, Internet

International Classification:

Subclass	Subgroup	Valid From
A47J	0043/044	01/01/2006
A47J	0043/07	01/01/2006
A47J	0043/08	01/01/2006