

This invention relates to a comminuting device for comminuting food materials according to the prior-art portion of claim 1.

An electric domestic appliance is already known in the art (DE-31 17 773 A1) which includes a cup-type attachment accommodating a cutter mechanism which is adapted to be driven by a drive motor and is equipped with a slowing-down brake for bringing the drive motor to a prompt halt. The brake necessary for this purpose is disposed between a lid seatable on the appliance provided with a motor, and a motor base. When the lid is in locking engagement with the motor base, an associated locking device is moved downwardly, and the friction pad provided between the lid and the base is removed by a driver plate, thereby preventing the brake from acting between the processing tool and the appliance. However, design reasons restrict the use of such a brake to such a particular type of domestic appliance.

Further, from EP-0 221 392 B1 a comminuting device for chopping, for example, parsley, onions, etc. is known which is formed by a lid and a container closable by the lid. The lid includes a first and a second coupling means which form a coupling device and are interconnected by a transmission means. The second coupling means provided in the container is rotatably connectible with a cutting blade adapted to rotate in the interior of the container. To drive the cutting blade, the first coupling means is caused to engage the processing tool of a food processor as, for example, the cutting blade of an immersion blender, so that, following activation of the immersion blender, the rotating processing tool causes rotation of the first coupling means, thereby also causing rotation of the cutting blade in the container through the transmission means and the second coupling means. On removing the immersion blender from the first coupling means, thus interrupting the driving connection to the cutting blade provided in the container of the comminuting device, the blade will continue to run for a period of some length, particularly in cases where no food materials are contained in the container. This may involve the risk of personal injury when an operator lifts the lid from the container while the blade continues to rotate and reaches into the container interior to remove the blade from the container.

Finally, from DE-A-22 50 177 a kitchen appliance is known in which a brake slowing down the processing tool is provided in the transmission path from the drive motor

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to the processing tool. The brake is controlled by a push rod extending centrally through the driving mechanism and the cutting blade, the push rod being in turn controlled by the lid of the appliance. The processing tool itself is rotatably or fixedly mounted in the bottom of the kitchen appliance.

It is therefore an object of the present invention to devise a comminuting device provided with a rotary cutting blade in which the processing tool and thus the cutting blade will have come to a halt in a particularly straightforward way at a moment not later than after removal of the driving mechanism from the attachment.

According to the present invention, this object is accomplished by the features of the characterizing portion of patent claim 1. By reason of the brake controlled by the axial displacement of the coupling device, the processing tool remaining in the container can be slowed down very rapidly in a simple way with the driving mechanism removed, in particular of a hand-held or immersion blender, that is, in the release position, thus precluding the possibility of personal injury by a rotating cutting blade when an operator's hand has access to the blade, because by then the blade will have come to a full stop. An arrangement of this type affords particular ease of manufacture because the brake is simply composed of two frictionally engageable members which, by axial displacement against the force of a spring, can be released (operating position) or engaged (release position) with ease and speed.

By virtue of the present invention, the lid incorporating the coupling device and closing the container can be configured in a still more straightforward way. By integrating the brake into the processing tool, only those processing tools that include a cutting blade have to be provided with a brake. Using, for example, a mixing tool without sharp edges for processing, it is not necessary for the processing tool to be braked because injuries cannot occur after the lid is removed and a hand reaches into the processing tool. Accordingly, the brake is only integrated into those processing tools in which it is desirable to avoid coasting. In consequence, when the attachment is offered with a processing tool having no cutting blades as in the case of a mixing tool without sharp edges, savings of manufacturing cost can be realized because the necessity of a brake is then obviated.

To provide a brake in the processing tool, it is proposed that the driven shaft be rotatably mounted on a trunnion secured in the bottom of the container and be axially displaceable relative to the trunnion, that the driven shaft include a bore accommodating the spring which has one end thereof biased against the trunnion, while its other end takes support upon an end surface of the driven shaft at the end remote from the trunnion, such that disengagement of the processing tool from the driving shaft results in an axial displacement of the processing tool relative to the trunnion by the force of the spring by an amount such that a first brake element provided on the driven shaft of the processing tool frictionally engages a second brake element provided on the trunnion. Thus, the processing tool bears against the trunnion and, on seating engagement of a driving mechanism with the coupling device, is displaced in the direction of the bottom of the container such that the brake becomes disengaged.

The provision of the brake in the processing tool is advantageous also in cases where the driving mechanism is seated down on the processing tool directly, because the processing tool slows down automatically upon detachment of the driving mechanism by moving away from the bottom of the container, its first brake element then frictionally engaging a projection formed on the trunnion and constituting the second brake element.

In order to keep the magnitude of the braking torque within specified limits, that is, in order to ensure that the force exerted on the brake by the spring does not exceed a specified value, it is provided in a further feature of the present invention that the spring takes support upon the trunnion through a sliding member axially slidable within the bore, and that a first stop is provided on the sliding member, which stop abuts a second stop arranged in the bore when the processing tool is in the braked position.

In order to permit ease of assembly of the sliding member, the stops and the brake in the bore of the processing tool, it is proposed in a still further feature of the present invention that the second stop be formed by a sleeve fixedly disposed in the bore, that the sleeve engage behind the first brake element through the annular shoulder configured as the second friction element, and that the sleeve include a bore within which the processing tool is rotatably and axially slidably mounted on the trunnion.

Further, it is advantageous that the bore includes longitudinal grooves into which the projections provided on the trunnion engage during the braking operation, which projections, however, in the operating position enter the bore and are spaced from the first brake element such a distance that the processing tool rotates freely. As the coupling means is disengaged from the processing tool, the driven shaft travels upwardly such an amount that the opposed projections abut the first brake element and then engage within the longitudinal grooves, thereby bringing the processing tool to an abrupt halt.

The present invention can be implemented in particular in a cutting blade rotating within a container and driven through the lid by an immersion blender in that the coupling device is comprised of a first and a second coupling means, that the first coupling means is adapted to be coupled to a processing tool of a hand-held blender, in particular an immersion blender, that the second coupling means is in engagement with the driven shaft through a longitudinally toothed section, that the first and the second coupling means are connected on a shaft in a manner preventing relative rotation, that the shaft is rotatably and axially slidably disposed in a plain bearing, that the shaft is rotatably mounted in a lid closing the container, and that the first coupling means is arranged outside and the second coupling means is arranged inside the container with the lid fitted onto the container. Accordingly, as soon as the immersion blender is detached from the first coupling means, the force of the spring causes this first coupling means to travel upwardly together with the second coupling means, producing frictional engagement of the brake, as a result of which the cutting blade comes to an abrupt halt before the lid is removed from the container.

An embodiment of a comminuting device of the present invention is illustrated in the accompanying drawings in which the Figures are shown in longitudinal sectional view. In the drawings,

FIG. 1 is a longitudinal sectional view of an embodiment of a comminuting device in which the cutting blade is shown in the braked condition;

FIG. 2 is a view as in FIG. 1, but showing the cutting blade in non-braked condition; and

FIG. 3 is a sectional view taken along the line III-III of FIG. 2.

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Referring now to FIGS. 1 and 2 of the drawings, the lid 5 is shown in a position removed from the container 1 in upward direction. While the first coupling means 4 is indicated by the reference numeral 4 in the Figures 1 and 2, it is not illustrated. The brake 33 is arranged in a bore 55 provided in the driven shaft 31 of the processing tool 3. The bore 55 is a blind-end bore against the end surface 39 of which a spring 7 bears with one end thereof. The spring 7 bears with its other end against a sliding member 38 having the shape of a piston. For improved central location of the spring 7 configured as a spiral spring within the bore 55, a spigot 56 formed on the sliding member 38 engages the interior of the spring 7. The spring 7 bears against an annular shoulder 57 provided on the sliding member 38. At the end of the sliding member 38 remote from the annular shoulder 57, an annular surface 40 is provided which, forming a first stop, tapers conically in the direction of the trunnion 37. Opposite the first stop 40 is a second annular surface 41 which, extending parallel to the annular surface 40 of the first stop, forms the second stop. The second annular surface 41 represents the end of a sleeve 42 secured within the bore 55 as by adhesive bonding or press-fitting, for example.

In FIG. 1, the sliding member 38 abuts with its first stop 40 against the second stop 41, whilst in FIG. 2 the sliding member 38 has its first stop 40 lifted clear of the second stop 41 in an upward direction. In FIGS. 1 and 2, the sleeve 42 includes an annular shoulder 43 which in the position illustrated in FIG. 1 engages behind the projections 58 provided on the trunnion 37, such that the underside provided on the projections 58 and serving as second brake element 11 abuts the annular shoulder 43 which forms the first brake element 10.

According to FIGS. 1 and 2, adjoining the annular shoulder 43 is a bore 44 of reduced diameter which engages the surface of the trunnion 37 such that the processing tool 3 is centrally located on the trunnion 37. The bore 44 includes full-length longitudinal grooves 60 which, for one thing, serve to enable the projections 58 of the trunnion 37 to pass through the bore 44 when the processing tool 3 is mounted on the trunnion 37 (FIG. 3). For another thing, the longitudinal grooves 60 also serve a locking function. When the lid 5 is removed from the container 1, the spring 7 displaces the driven shaft 31 upwardly such an amount that the projections 58 have their undersides in abutting engagement with the annular shoulder 43. Considering that in this position shown in FIG. 1 the biasing force of the spring 7 is not used up

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as yet, the projections 58 slide into the longitudinal grooves 60 while the processing tool 3 continues to rotate (FIG. 3), causing the processing tool 3 to come to an abrupt stop. However, it may also be contemplated to screw the sleeve 42 down tight into the bore 55 of the driven shaft 31 by means of a thread not shown in the drawings.

The mode of operation of the comminuting device of FIGS. 1 and 2 is as follows:

With the processing tool 3 in the interior of the container 3 and mounted on the trunnion 37 as shown in FIG. 1, the processing tool 3 bears through its end surface 61 provided on the piston 38 against the free end 62 of the trunnion 37. The weight resulting from the cutting blades 54 and the driven shaft 31 is transmitted through the spring 7 and the piston 38 to the trunnion 37, with the force of the spring 7 being required to be sufficiently large to enable the projections 58 to engage the longitudinal grooves 60 (FIG. 3).

When the lid 5 is subsequently placed down onto the container 1 properly, the longitudinally toothed section 32 will engage the mating toothed section 63 provided on the processing tool 3, until the end surface 64 provided on the socket member 30 abuts the end surface 65 of the processing tool 3. Before the lid 5 is in proper seating engagement with the periphery of the container 1, the processing tool 3 will be displaced through the end surface 65 in opposition to the force of the spring 7 in the direction of the bottom 36 of the container 1 until the position illustrated in FIG. 2 is attained. Because the piston 38 bears against the free end 62 of the trunnion 37, it will maintain its position shown in FIGS. 1 and 2 on axial displacement of the driven shaft 31, whilst the driven shaft 31 will travel in the direction of the bottom 36, as a result of which the second stop 41 will move away from the first stop 40. As this movement occurs, the longitudinal grooves 60 will disengage from the projections 58, thus entering the space formed by the bore 55. In this position (FIG. 2), the first friction element 10 is at a relative distance to the second friction element 11, and hence the brake 33 is disengaged, that is, the processing tool 3 is no longer slowed down by the trunnion 37. This then enables the food materials held in the container 1, such as parsley or onions, to be chopped or comminuted by the cutting blades 54 if the shaft 9 is rotated by a drive motor, not shown in the drawings, of a food processor as, for example, an immersion blender.

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When the immersion blender is subsequently detached from the first coupling means 4, the processing tool 3 will continue to rotate for a while, such rotation continuing, however, only until the lid 5 is removed from the container 1. At this instant, the driven shaft 31 will again travel upwardly to its position shown in FIG. 1, until the second stop 41 is short of abutment with the first stop 40. In this position, the first and the second friction element 10 and 11, respectively, are in relative frictional engagement, thus braking the processing tool 3. As the rotary motion of the processing tool 3 continues decelerating, the longitudinal grooves 60 will engage the projections 58 (FIG. 3), bringing the processing tool 3 to an abrupt halt. This is possible because the force of the spring 7 continues to urge the processing tool 3 upwardly against the direction of the arrow X before the second stop 41 abuts the first stop 40.

According to FIGS. 1 and 2, one possibility of displacing the processing tool 3 involves removing the lid 5 from the container 1, while another possibility is to provide for axial displacement of the shaft 9 with the coupling device 17, such that an immersion blender, on being fitted, displaces the coupling device 17 which in turn displaces the processing tool 3 into its non-braked position.

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Patent Claims:

1. A comminuting device for comminuting food materials, including a processing tool (3) rotatably mounted in a container (1) and formed by a driven shaft (31) and by a cutting blade (35), with the axially extending driven shaft (31) being adapted to be coupled to the driving mechanism of a food processor (1), in particular a hand-held blender, by means of a coupling device (4 and/or 6), with a brake (33) controllable by a spring (7) being provided in the transmission path between the coupling device (4 and/or 6) and the processing tool (3), characterized in that the brake (33) is provided in the driven shaft (31) of the processing tool (3), and that said brake (33) is controllable by displacement of the processing tool (3) relative to the container (1).

2. A comminuting device as claimed in claim 1, characterized in that the driven shaft (31) is rotatably mounted on a trunnion (37) secured in the bottom (36) of the container (1) and is axially displaceable relative to said trunnion, that the driven shaft (31) includes a bore (55) accommodating the spring (7) which has one end thereof biased against the trunnion (37), while its other end takes support upon an end surface (39) of the driven shaft (31) at the end remote from the trunnion (37), that disengagement of the processing tool (3) from the driving shaft (9) results in an axial displacement of the processing tool (3) relative to the trunnion (37) by the force of the spring (7) by an amount such that a first brake element (10) provided on the driven shaft (31) of the processing tool (3) frictionally engages a second brake element (11) provided on the trunnion (37).

3. A comminuting device as claimed in claim 2, characterized in that the spring (7) takes support upon the trunnion (37) through a sliding member (38) axially slidable within the bore (55), and that a first stop (40) is provided on the sliding member (38), said stop abutting a second stop (41) arranged in the bore (55) when the processing tool (3) is in the braked position.



4. A comminuting device as claimed in claim 3, characterized in that the second stop (41) is formed by a sleeve (42) fixedly disposed in the bore (55), that said sleeve (42) engages behind the first brake element (10) through the annular shoulder (43) configured as the second friction element (11), and that said sleeve (42) includes a bore (44) within which the processing tool (3) is rotatably and axially slidably mounted on the trunnion (37).

5. A comminuting device as claimed in claim 4, characterized in that the bore (44) includes longitudinal grooves (60) into which the projections (58) provided on the trunnion (37) engage during the braking operation, said projections entering, however, in the operating position the bore (55) and being spaced from the first brake element (10) such a distance that the processing tool (3) rotates freely.

6. A comminuting device as claimed in claim 1, characterized in that the coupling device is comprised of a first (4) and a second coupling means (6), that said first coupling means (4) is adapted to be coupled to a processing tool (3) of a hand-held blender, in particular an immersion blender, that said second coupling means (6) is in engagement with the driven shaft (31) through a longitudinally toothed section (32), that said first (4) and said second (6) coupling means are connected on a shaft (9) in a manner preventing relative rotation, that said shaft (9) is rotatably and axially slidably disposed in a plain bearing (22), that said shaft (9) is rotatably mounted in a lid (5) closing the container (1), and that said first coupling means (4) is arranged outside, and said second coupling means (6) is arranged inside, the container (1) with the lid (5) fitted onto the container (1).

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21 Apr 95/BH.