

This Sheet Has Been Replaced



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REPLACED

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The present invention relates to a device for the preparation of coffee powder, comprising a container for coffee beans, a grinding mechanism with an electric motor, and a dispensing and/or braking device for ground coffee powder, wherein the grinding mechanism comprises one fixed and one rotating grinding wheel with internal grinding teeth, the distance between the grinding wheels is adjustable and the dispensing and/or braking device is provided tangentially and radially outside the grinding wheels.

Electric coffee grinders which dispense the coffee powder in portions are commonly known and are predominantly used in coffee machines in the catering trade, but increasingly also in offices and in the home.

These known devices for the preparation of coffee powder are relatively voluminous and/or generate noise caused by the deflection of the flow of beans and/or powder by the control elements necessary for this purpose. The coffee beans are fed in concentrically via a central funnel in the region of the rotation axis of the grinding wheels, which, owing to the restricted spatial conditions, can actually lead to jamming of the grinding mechanism, in particular if the coffee is of insufficiently high quality.

Therefore, an object of the present invention is to provide a device which has greater operational reliability and does not have the disadvantages

of the prior art, and which has optimum material flow and does not generate noise when measuring out and/or ejecting the powder.

It is also an object of the invention to keep the overall height of the device low and to construct the device in such a manner that it can be associated with an existing brewing assembly in a coffee machine in a space-saving manner.

According to the invention, this object is achieved in that the grinding wheels are arranged vertically or form an acute angle with the vertical, the coffee beans being fed in statically via a discharge funnel substantially unilaterally between the grinding wheels.

Feeding in the coffee beans according to the features of claim 1 reduces the danger of the grinding wheels becoming jammed. The beans pass substantially into the lower region of the grinding mechanism owing to the vertically acting gravitational force, with the result that there is sufficient room left for their displacement and distribution over both grinding wheels. In addition, the driving power of the electric motor can be reduced, and the coffee grinder operates with a lower necessary torque.

A further advantage consists in that, by preselecting the grinding time, the reproducibility of the quantity of coffee powder is improved in relation to feeding the beans in co-axially.

Advantageous embodiments of the subject of the invention are described in the subsequent, dependent claims.

The necessary overall height is considerably reduced by the device according to claim 2, which permits use of the free region between the stator and the grinding mechanism. A further advantage consists in that the thermal expansion which occurs during operation of the coffee grinder is absorbed by the grinding-mechanism housing; the grinding gap between the grinding wheels does not change.

The adjusting device according to claim 3 is particularly advantageous and economical to produce.

The embodiment according to claim 4 permits very simple adjustment by means of a simple adjusting tool - a cylindrical pin.

The axial bearing clearance is compensated for by the incorporation of a compression spring according to claim 5. The grinding mechanism retains its pre-adjusted setting and thermal expansions are compensated for. In addition, the resulting locking of the adjusting wheel ensures that it retains its position even in the event of vibration.

Adjusting the quantity of coffee powder dispensed by adjusting the grinding time, according to claim 6, has proved successful.

The kinetic energy of the freshly ground coffee powder is very great owing to the centrifugal forces generated by the rotating grinding wheel. A blade of spring steel according to claim 7 absorbs a substantial amount of the energy and prevents soiling of a coffee machine connected downstream.

The coffee-powder ejection opening according to claim 8 is a preferred embodiment. It absorbs all the kinetic energy of the ground coffee

powder and, with appropriate dimensioning, fills up without causing reflux onto the grinding mechanism.

Two hollow cylinders pushed one inside the other according to claim 9 produce a slot-type closure which can easily be moved, even in the case of fine coffee powder.

By means of the vibration element, for example a piezo element powered by a small HF generator, according to claim 10, the evacuation of the coffee-powder ejection opening can be improved.

Particularly in the case of larger coffee machines, there is a desire to use two or more different types of coffee, and thus the division of the container according to claim 11 proves advantageous.

The use of a controllable tilting funnel according to claim 12, allowing simplification of the brewing assembly connected downstream, is particularly economical.

Embodiments of the subject of the invention will be further described with reference to the drawings, wherein:

Fig. 1 shows a practical embodiment of two coffee grinders arranged in a coffee machine;

Fig. 2 shows details of one of the two coffee grinders according to Fig. 1;

Fig. 3 shows a further development of a controlled coffee-powder ejection opening with a vibration element, and

Fig. 4 shows a sectional view perpendicular to the longitudinal axis of Fig. 3, with the ejection slots closed.

In the figures, like parts are provided with like reference numerals.

In Fig. 1, coffee grinders are designated by the reference numeral 1. These are arranged at right angles to one another, at an angle α of 45° to the vertical L, and their two discharge funnels 2 are flanged to a bean container 28, comprising two chambers 28', 28'', via a selector disc 27.

Fig. 1 also shows a grinding mechanism 3 comprising two grinding wheels 4 and 5 arranged in a grinding-mechanism housing 15. Part of a rotatable bearing flange 6 provided with bores 10 is visible in a recess in the housing 15, formed by connecting members 15'.

The two grinding mechanisms 3 have identical coffee-powder ejection openings 21 with spring blades 22 and 22', indicated by broken lines. The ejection openings 21 open into a tilting funnel 29, provided with an adjusting mechanism 29', which supplies brewing chambers (not shown) therebelow.

Fig. 2 shows a part sectional view of the coffee grinder 1 arranged on the right-hand side. The coffee-powder ejection opening 21 with its spring blade 22 can again be seen on the left-hand side, the spring blade 22 also being shown in its ejection position 22' deflected in the direction of the arrow. The opposing connecting members 15' of the housing 15 can be seen at the edges; inside, the bearing flange 6 with its axial bores 10 is visible, and thereabove locating grooves 24 formed as recesses. The bearing flange 6 is provided with an external thread 7

and is screwed into an internal thread 16 of the grinding-mechanism housing 15. A standard ball bearing 8, which is mounted with its outer ring in the bearing flange 6, is arranged on the central motor shaft 9. A mounting flange 11, on which the lower, rotating grinding wheel 5 of the grinding mechanism 3 is centrally fixed by means of three peripheral fixing screws 14, is arranged above the bearing flange 6 in a larger bore thereof. The fixed grinding wheel 4 with its fixing screws 14' is arranged a short distance above the rotating grinding wheel 5 and is screwed centrally to the upper grinding-mechanism flange 17. The grinding wheels 4 and 5 are provided with grinding teeth 23 in a known manner.

The mounting flange 11 is for its part fixed to the motor shaft 9 by means of its centering bore 12 and its central screw connection 13.

The discharge funnel 2 arranged thereabove is indicated by dot-dash lines. The feed opening for coffee beans KB is designated by 18.

It can be seen from Fig. 2, in conjunction with Fig. 1, that the coffee beans KB slide down vertically, i.e. due to gravity, unilaterally between the grinding wheels 4, 5, and that space is consequently provided for their displacement in the upper part of the grinding mechanism 3, preventing the grinding wheels 4, 5 from jamming.

The plate-shaped bearing flange 6 is also provided with recesses, producing locating grooves 24 in which three radially arranged, cambered pins 20 engage and which are loaded by springs 19.

A terminal box with electrical connections 25, which lead to a time-controlled power source T, is provided on the side of the commonly known motor of the coffee grinder 1.

It can be seen from Fig. 2 that, by rotating the bearing flange 6 by means of e.g. a cylindrical pin, the said flange 6, with its ball bearing 8, the shaft 9 and the grinding wheel 5, is axially displaced in the direction of the arrow relative to the stator S or motor housing 42, and that the cambered pins 20 are temporarily lifted from the locating grooves 24.

This produces specific adjustment of the degree of grinding and also prevents unwanted adjustment in the event of vibration.

The quantity of powder dispensed is preferably determined by temporal control of the grinding time by means of a suitable power source T with a commonly known pulse counter. The connection to the power source T is produced via plug-in connections 25.

It can also be seen from Fig. 2 that the spring blade 22 acts as a dynamic brake for the freshly ground coffee powder cast from the grinding mechanism 3 and that it is deflected in the direction of the arrow into the position of the spring blade 22' indicated by broken lines.

The coffee-powder ejection opening 21', according to Fig. 3, represents an improvement over the ejection opening 21 and permits the complete evacuation thereof.

This ejection opening 21' is mounted by means of a flange 30' on a grinding-mechanism housing 15", which has been slightly modified in relation to Fig. 2, and comprises an ejection pipe 30 inside which an ejection cylinder 31 is rotatably mounted. The ejection cylinder 31 is provided with an annular groove 41, into which a shaft securing means



40 (Seeger ring) is inserted, and is axially secured on the opposite side by a swivelling lever 32.

The ejection pipe 30 and the ejection cylinder 31 have ejection slots 33, 34 which are closed by rotation according to Fig. 4 and opened by rotation according to Fig. 3. This process is carried out via a swivel arm 39 which is connected to an electromagnet in the arrow direction according to Fig. 4 and rotates the swivelling lever 32 through approximately 90°.

For improved evacuation of the coffee-powder ejection opening 21', the latter is provided according to Fig. 3 with a vibration element 35, on which is mounted a piezo element 37 connected via a feeder cable 38 to a known HF generator G, by means of which the piezo element 37 and the vibration element 35 vibrate in resonance.

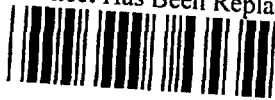
Although the embodiment relates to dispensing by predetermining or preselecting the grinding time, the subject of the invention can also be used in connection with volumetric dispensing devices.

A preferred use of the arrangement shown in Fig. 1 is in a very compact, attractively constructed coffee machine for the catering trade according to the parallel patent application (our ref. 21273 PCT).

List of Reference Numerals

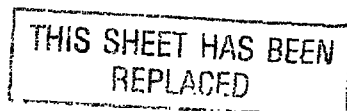
- | | |
|---------|---|
| 1 | Coffee grinder |
| 2 | Discharge funnel |
| 3 | Grinding mechanism |
| 4 | Fixed grinding wheel |
| 5 | Rotating grinding wheel (adjustable) |
| 6 | Bearing flange |
| 7 | External thread |
| 8 | Ball bearing |
| 9 | Motor shaft |
| 10 | Bores (adjustment) |
| 11 | Mounting flange |
| 12 | Centering bore |
| 13 | Central screw connection |
| 14, 14' | Fixing screws |
| 15 | Grinding-mechanism housing |
| 15' | Connecting members on 15 |
| 16 | Internal thread |
| 17 | Grinding-mechanism flange |
| 18 | Feed opening |
| 19 | Compression springs |
| 20 | Pins (cambered) |
| 21 | Coffee-powder ejection opening |
| 21' | Coffee-powder ejection opening (with slot-type closure) |
| 22 | Spring blade |
| 22' | Spring blade deflected |
| 23 | Grinding teeth (teeth of 4, 5) |
| 24 | Locating grooves (recesses in 6) |
| 25 | Electrical connections |

26	Stripping cams (three)
27	Selector disc
28	Bean container
28'	1st chamber
28"	2nd chamber
29	Tilting funnel
29'	Adjusting mechanism for 29
30	Ejection pipe (fixed)
31	Ejection cylinder (pivotal)
32	Swivelling lever
33	Ejection slot in 31
34	Ejection slot in 30
35	Vibration element
36	Clamping ring
37	Piezo element
38	Feeder cable
39	Swivel arm
40	Shaft securing means (Seeger ring)
41	Annular groove
42	Motor housing
α	Angle (between vertical and the axis of the grinding mechanism)
G	HF generator
KB	Coffee beans
L	Vertical
S	Stator
T	Power source (time-controlled)

Claims

1. A device for the preparation of coffee powder, comprising a container for coffee beans, a grinding mechanism with an electric motor, and a dispensing and/or braking device for ground coffee powder, wherein the grinding mechanism comprises one fixed and one rotating grinding wheel with internal grinding teeth, the distance between the grinding wheels is adjustable and the dispensing and/or braking device is provided tangentially and radially outside the grinding wheels, characterised in that the grinding wheels (4, 5) are arranged vertically (L) or form an acute angle (α) with the vertical (L), the coffee beans being fed in statically via a discharge funnel (2) substantially unilaterally between the grinding wheels (4, 5).
2. A device according to claim 1, characterised in that the adjusting device (6, 10) of the one grinding wheel (5) is provided between the latter and the stator (S) of the electric motor.
3. A device according to claim 2, characterised in that the adjusting device (6, 10) comprises a bearing flange (6) with an external thread (7) and a ball bearing (8) on the driving side, the bearing flange (6) being screwed into a grinding-mechanism housing (15) in an axially adjustable manner.
4. A device according to claim 3, characterised in that the grinding-mechanism housing (15) is connected via connecting members (15') to a motor housing (42) at the front, and in that bores (10) are provided in the edge region of the bearing flange (6) in the axial direction for the engagement of an adjusting tool.





5. A device according to claim 4, characterised in that at least one compression spring (19) is provided which loads the bearing flange (6) in the axial direction.
6. A device according to claim 1, characterised in that the dispensing of the coffee powder in portions is carried out by reproducible preselection of the grinding time (T).
7. A device according to claim 6, characterised in that a spring blade (22) is arranged as a dynamic powder brake in the coffee-powder ejection opening (21).
8. A device according to claim 6, characterised in that the coffee-powder ejection opening (21') is cylindrical in shape and is closed at one end, and in that a powder outlet (33, 34) is provided in its cylindrical casing (30, 31).
9. A device according to claim 8, characterised in that the coffee-powder ejection opening (21') has two hollow cylinders (30, 31) pushed one inside the other and provided with powder outlets (33, 34), these being mutually displaced during the grinding process and being aligned thereafter by rotation.
10. A device according to claim 9, characterised in that a vibration element (35, 37) is connected to the inner hollow cylinder (31).
11. A device according to claim 1, characterised in that at least two chambers (28', 28'') are provided in the container (28) for different types of coffee.





12. A device according to claim 11, characterised in that at least two grinding mechanisms (3) are associated with the container (28), a controllable tilting funnel (29, 29') being connected downstream of the grinding mechanisms (3).