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U1S 1105 B2A

(56) Documents cited
None

(58) Field of search
B2A

(54) Coffee mill construction for a coffee extractor

(57) A coffee mill construction has a case (200), an electric motor (144), and a grinder (300) disposed on a horizontal drive shaft (148) of the motor adjacent an inner surface of the case thereby uniformly mixing and grinding the coffee beans.

FIG. 2

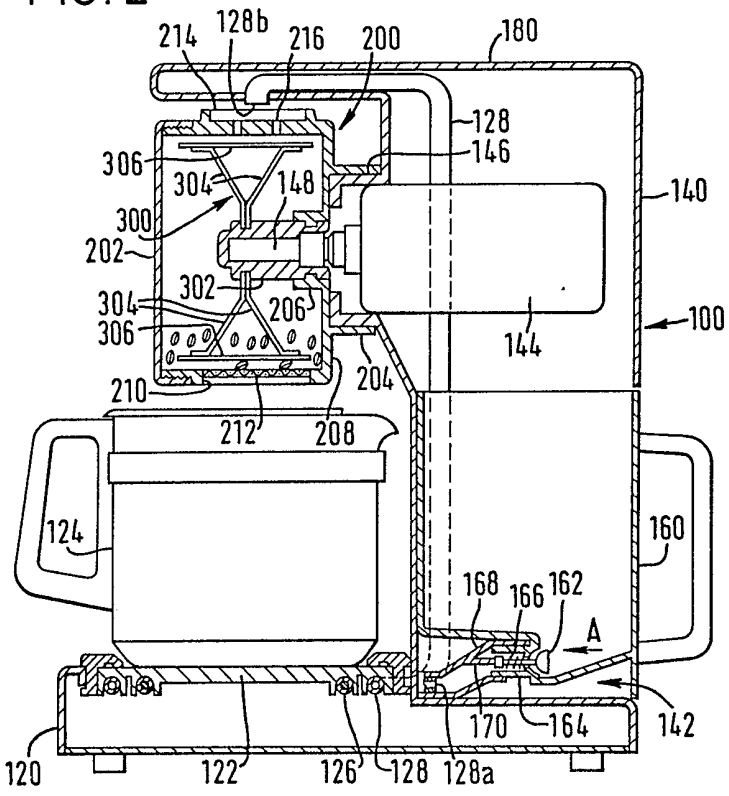

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FIG. 1

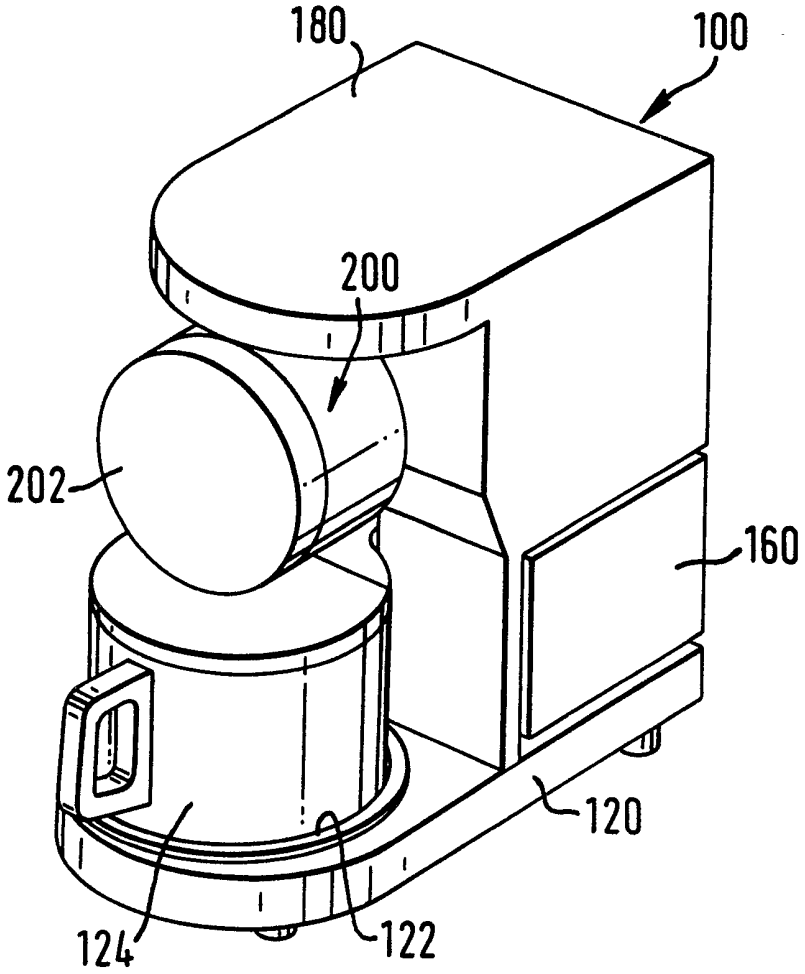
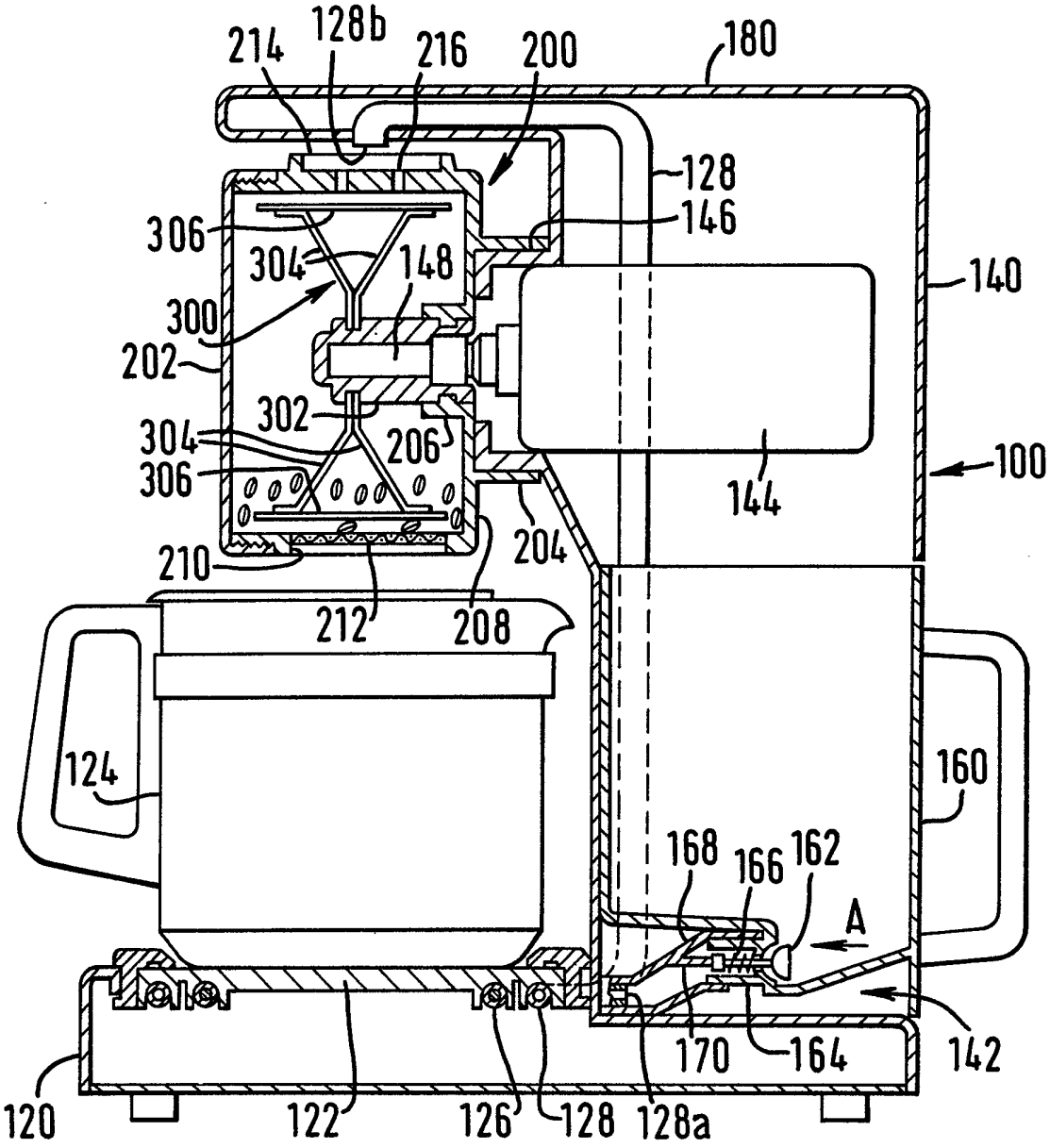


FIG. 2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128b
216
200
180
128
146
306
304
148
140
300
202
302
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206
306
100
144
210
204
212
208
124
160
168
166
162
A
170
164
142
120
122
126
128
128a

FIG. 3

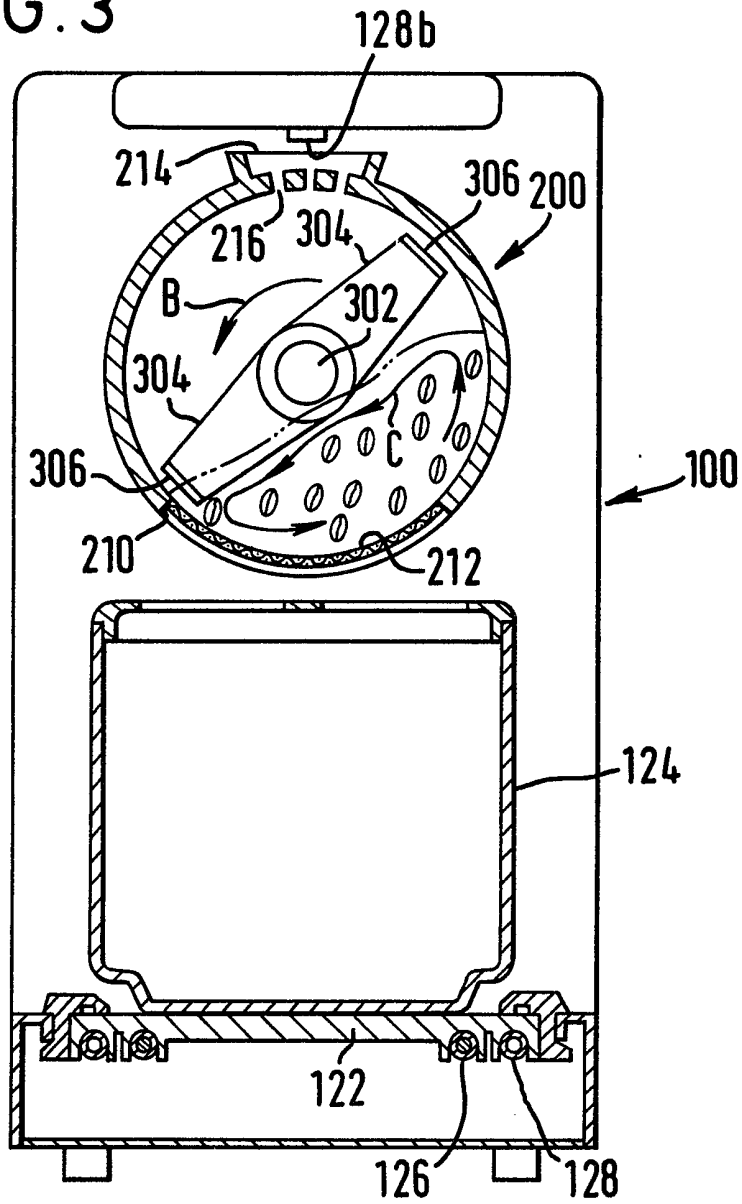

128b
214
216
304
306
200
B
302
304
C
306
100
210
212
124
122
126
128

FIG. 4

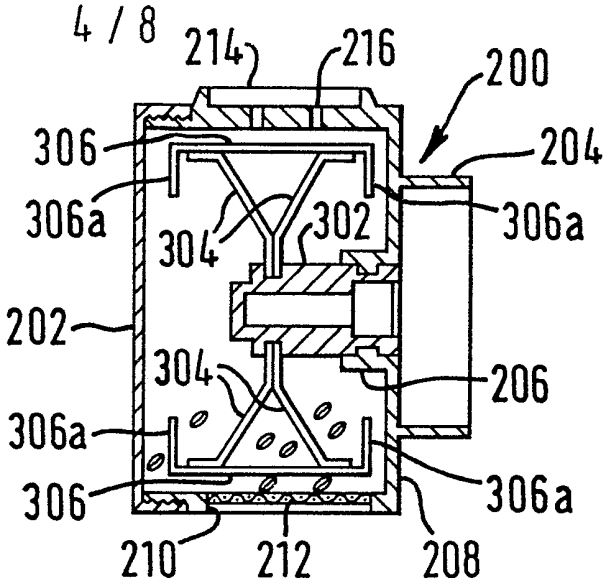


FIG. 5

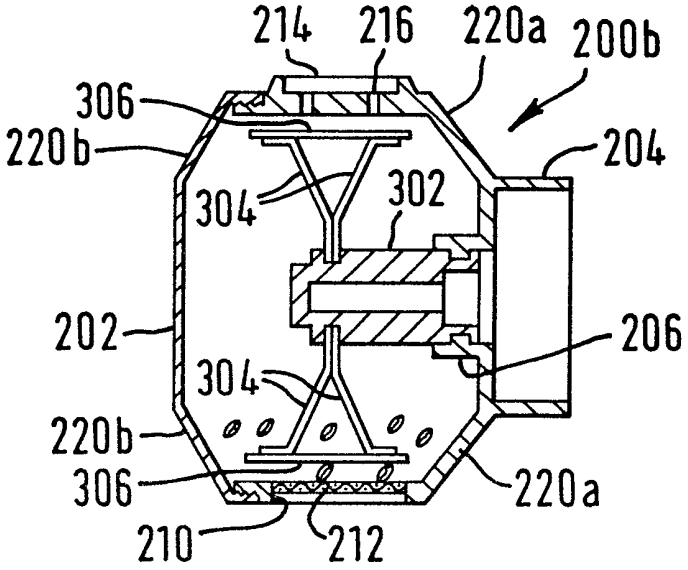


FIG. 6

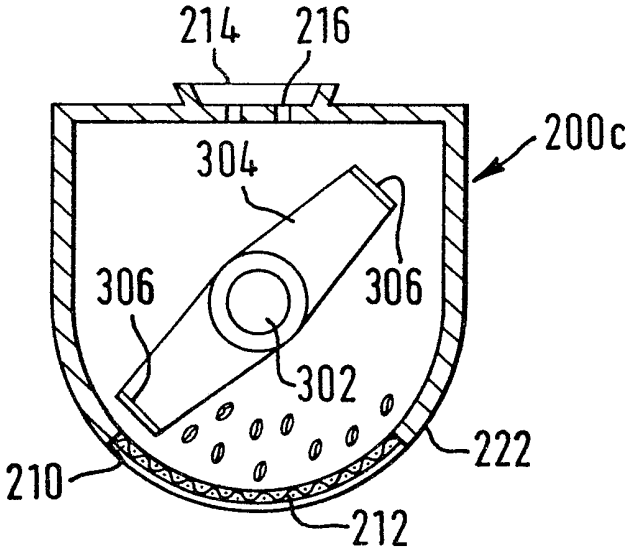
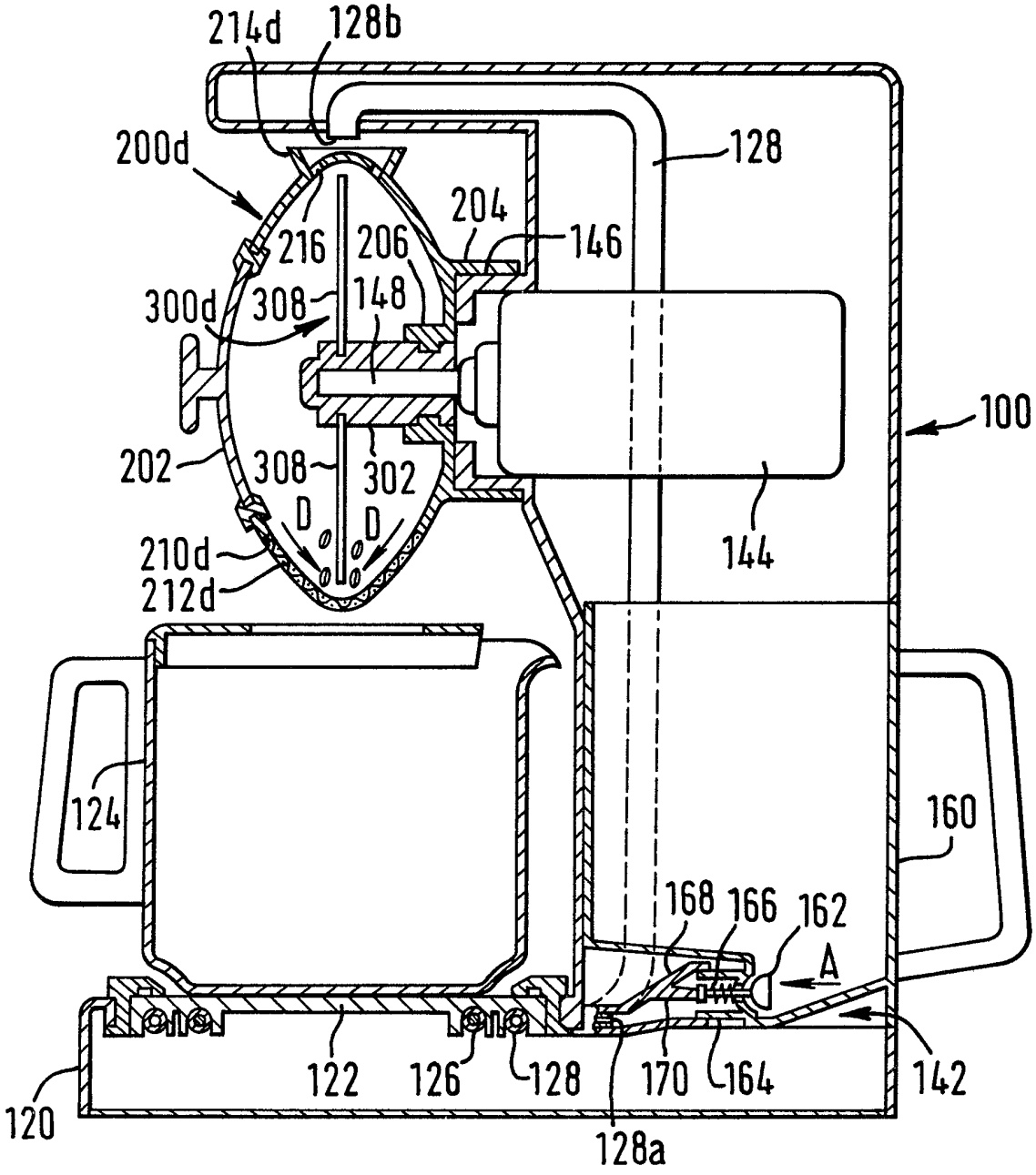


FIG.7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200d
128
204
216
206
146
300d
308
148
100
202
308
302
D
D
210d
212d
144
124
160
168
166
162
A
122
126
128
170
164
142
120
128a

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FIG. 8

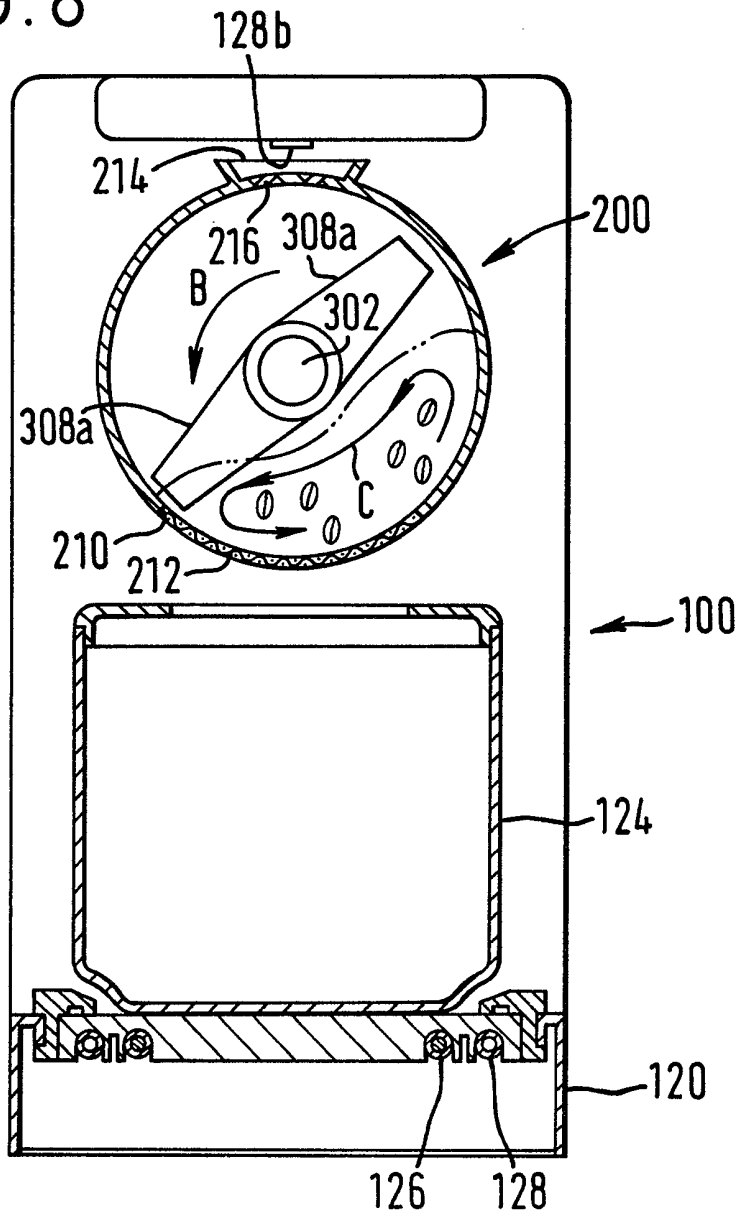


FIG. 9

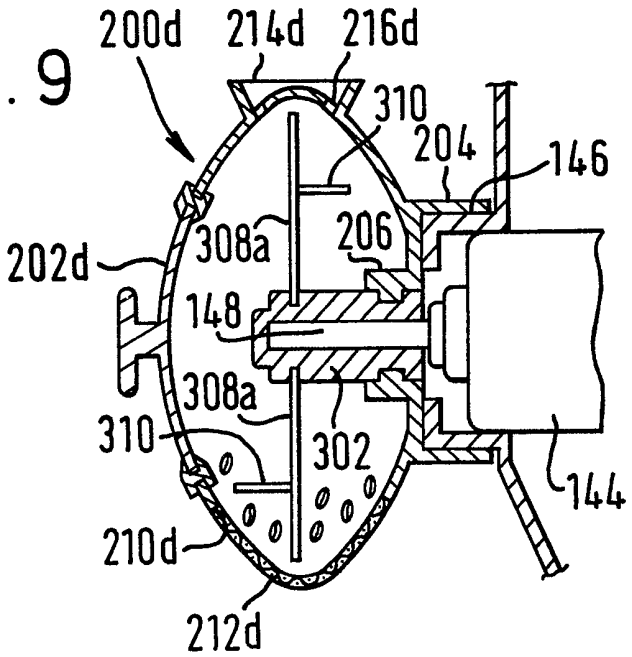

200d
214d
216d
310
204
146
308a
206
202d
148
308a
310
302
144
210d
212d

FIG. 10

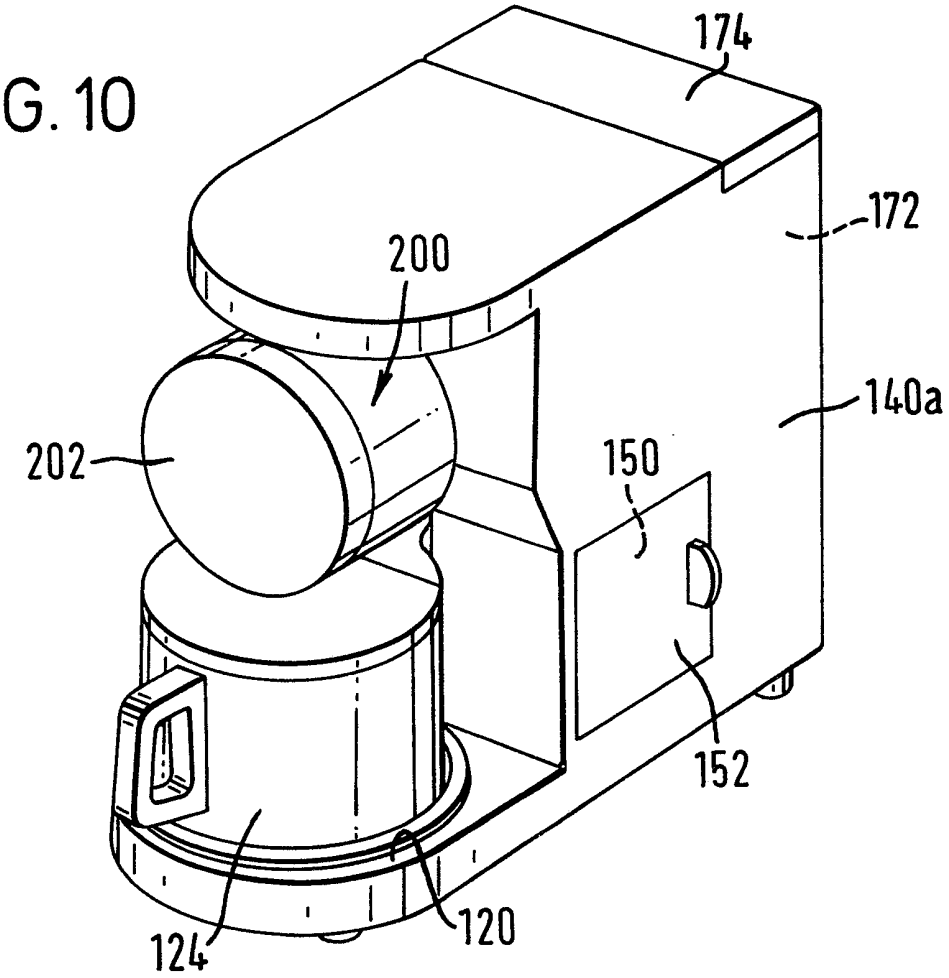
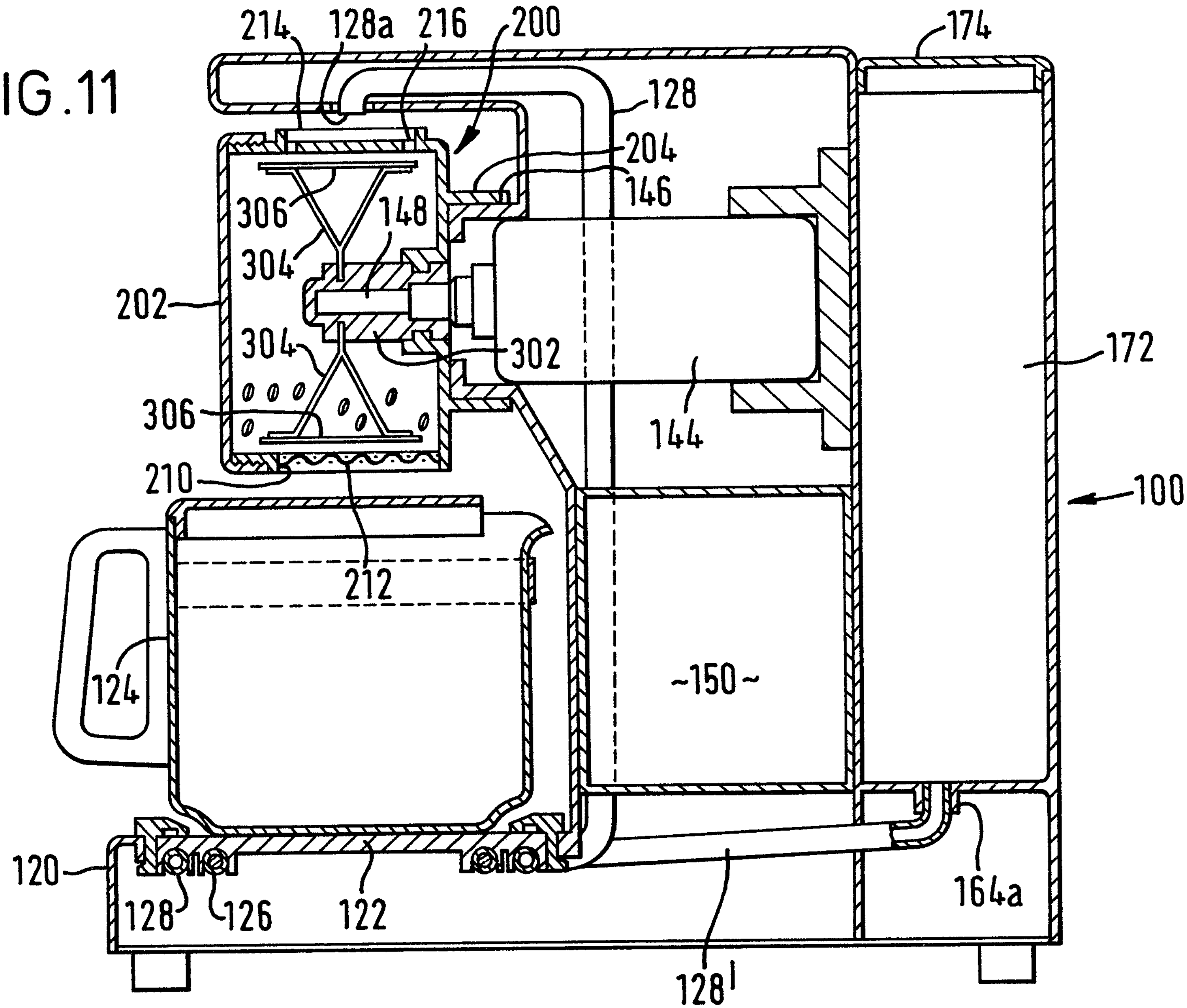

174
172
200
140a
202
150
152
124
120

FIG.11


214
128a
216
200
174
128
204
146
306
148
304
202
304
302
172
306
144
210
100
212
150
124
120
128
126
122
164a
128'

SPECIFICATION

Coffee mill construction for a coffee extractor

The present invention relates to a coffee mill construction.

A conventional coffee mill has a grinder which is rotated horizontally in a case to crush coffee-beans. The grinder is positioned at the bottom of the case and rotated around a drive shaft by a motor, as shown in Japanese Patent No. Sho 58-325 published January 6, 1983, and also in U.S. Patent No. 4,196,658. The motor is mounted below the case. Therefore, coffee-beans are ground while being rotated horizontally together with the horizontally rotated grinder.

According to the present invention, there is provided a coffee mill construction comprising:

a housing;

a case, installed on said housing, for receiving coffee-beans;

an electric motor carried by said housing, said motor having a substantially horizontally disposed drive shaft extending into the case; and

a grinder, disposed on said drive shaft in the case and rotating vertically within the case for grinding said coffee-beans.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view showing a first embodiment of the invention;

Figure 2 is a vertical section view of the first embodiment of the invention;

Figure 3 is a sectional side view of the first embodiment of the invention;

Figures 4 and *5* are enlarged vertical views showing a case and a grinder of respective second and third embodiments of the invention;

Figure 6 is an enlarged sectional side view showing a case and a grinder of a fourth embodiment of the invention;

Figure 7 is a vertical section view showing a fifth embodiment of the invention;

Figure 8 is a sectional side view showing the fifth embodiment illustrated in Figure 7;

Figure 9 is an enlarged vertical view showing a case and a grinder of a sixth embodiment of the invention;

Figure 10 is a perspective view showing a seventh embodiment of the invention; and

Figure 11 is a vertical sectional view showing the construction illustrated in Figure 10.

A first embodiment of a coffee mill construction for a coffee extractor according to this invention will be described with reference to Figures 1 to 3.

In these Figures, reference numeral 100 designates a body of the coffee mill construction (hereinafter referred to merely as "mill" when applicable). The body 100 of the mill comprises a base 120 in the form of a relatively flat container, and a frame 140 in the form of a rectangular box having a cavity 142 for accommodating a water storing tank 160 and having a top plate 180 extended horizontally above the base 120. The water storing tank 160 is removably disposed in the cavity 142 between the frame and the base. The base has a supporting section 122 to support a coffee container such as a cup, bottle or pot 124. The pot supporting section 122 has a sheathed heater 126 and a water supplying pipe 128 which operate together to make hot water.

The water storing tank 160 has a check valve 162 at a water supply outlet 164. The check valve 162 is biased by a coil spring 166 to close the outlet 164, as shown by arrow A. One end 128*a* of a pipe 128 is removably connected to the outlet 164 at a connecting portion 168, and a projection 170 is made in the connecting portion 168 to depress the check valve 162 against the coil spring 166 when the water storing tank 160 is completely set within the cavity 142.

The frame 140 includes a circular projected portion 146 which secures an electric motor 144 above the water storing tank 160. The motor 144 is positioned on the frame 140 so that a drive shaft 148 of the motor is disposed horizontally. The drive shaft 148 is projecting to the left of the circular projected portion 146 as shown in Figure 2.

Numeral 200 designates a case for coffee-beans, which has a horizontally cylindrical form. The case 200 has a cover 202 which is secured to the case by a peripheral screw. The case 200 also has a circular projection 204, which is constructed on the side of the case 200 and fitted to the circular projected portion 146 to hold the case 200 against the frame 140. Numeral 206 is an axis supporting portion. It is constructed in the form of a cylindrical inner projection at the centre of a side wall 208 of the case.

Numeral 300 is a grinder to mill coffee-beans in the case 200. The grinder 300 is disposed on the drive shaft 148 by a cutter support 302. The cutter support 302 is movably connected between the driving shaft 148 and the axis supporting portion 206, and is disposed rotatably with the drive shaft 148. The grinder 300 consists of a pair of arm parts 304 and a pair of cutter parts 306. The arm parts 304 are fixed on the cutter support 302. The cutter parts 306 are connected with the arm parts 304 so as to be parallel with the cylindrical face of the case 200 and spaced therefrom by a predetermined, optimal distance.

Numeral 210 designates an opening constructed in the bottom of the case. A filter 212 is positioned at the opening 210 for coffee to filter therethrough.

A hot water receiving portion 214 is provided at the top of the case 200, and is seen to form a cylindrical projection having apertures 216 inside for hot water to pass into the case 200. Numeral 128*b* designates the other end of the water supplying pipe 128 to feed hot water into the case 200 through the receiving portion 214.

The operation of the first embodiment of the invention will now be described. Initially, case 200 is removed from the circular projected portion 146 of the frame 140. The grinder 300 remains attached to the cutter support 302 and is removed with the case 200. The cover 202 is removed from the case, and a predetermined amount of coffee-beans is placed inside. The cover 202 is then secured to the case again, and the case is installed on the frame

projected portion 146 with the grinder positioned inside the case as clearly shown in Figures 2 and 3.

The water storing tank 160 is now removed from the cavity 142 of the frame 140. After pouring a predetermined amount of water (sufficient for serving four persons, in general) into the water storing tank 160, the water storing tank 160 is once again placed in the cavity 142. When the tank 160 is removed from the frame, the check valve 162 closes the water supplying outlet 164 by the force of the coil spring 166 (indicated by arrow A in Figure 2).

When the electric motor 144 is actuated, the grinder 300 is rotated by the cutter support 302 around the drive shaft 148 (indicated by arrow B in Figure 3). By rotating the cutter support 302, the cutter parts 306 of the grinder 300 rotate in the direction of arrow B along the inner arc-shaped surface of the case 200. This rotation occurs since the cutter support 302 extends horizontally from the motor 144 into the case 200. All coffee beans in the case are stirred up and down by the action of the grinder (indicated by arrow C in Figure 3), and homogeneously ground. After uniformly sized ground coffee is formed, the motor 144 is cut off.

Energization of the sheathed heater 126 heats pot 124. The heater 126 also makes hot water by heating water in the water supplying pipe 128 and the water storing tank 160. Boiling water pressure causes the hot water to flow from the tank 160 up through the pipe 128 to the pipe end 128*b*. The hot water drops from the end 128*b* of the pipe 128 to the hot water receiving portion 214 and accumulates therein. Thus, it drops into the case 200 through the apertures 216. The hot water permeates the coffee powder and picks up coffee extract to produce liquid coffee. The liquid coffee is filtered through the filter 212 and drops into the pot 124.

In the manner as described above, the water in the water storing tank 160 is continuously supplied as hot water into the case 200 through the pipe 128, and is extracted as liquid coffee from the case 200 for storage in the pot 124. The coffee in the pot 124 will remain hot while resting on the pot supporting section 122 by means of the heater 126 and a thermostat (not shown).

After completion of coffee liquid extraction, i.e., after the use of the mill, the case 200 is removed from the frame 140. The case 200 may be washed to remove the coffee-dregs.

As is apparent from the above description, in the first embodiment of the coffee mill construction according to the invention, the case 200 is provided in the form of a horizontal cylinder, the grinder 300 is rotated in a vertical plane around the drive shaft 148 which is disposed horizontally. The grinder 300 rotates along the inner arc-shaped surface of the case 200. The rotating field of the grinder 300 extends over all of the inner space of the case thus permitting through mixing of the coffee beans and production of a uniformly homogeneous coffee grind.

Thus, even if the amount of coffee-beans in the case is less or more than the "correct" amount as described above in reference to conventional mill constructions, all of the coffee-beans are ground equivalently by means of the up and down stirring of coffee-beans by the vertically rotating grinder (as shown by arrow C in Figure 3). Thus, ground coffee, i.e., coffee powder, of homogeneous size is produced in spite of the amount of coffee-beans used.

In the above described embodiment of the mill construction, the case is provided in the form of a cylinder, and the grinder is composed of arm parts and cutter parts. However, the invention is not limited to such a construction. Other embodiments of the mill construction according to the invention will now be described with reference to Figures 4 to 11.

A second embodiment of a mill is shown in Figure 4, in which a different style of the cutter parts is illustrated. The cutter parts 306 have a pair of folded members 306*a* which fold toward the centre of the case at both ends thereof.

Thus, coffee-beans are ground even more thoroughly than in the first embodiment, since the folded members 306*a* stir the coffee-beans up and down.

A third embodiment of a mill is shown in Figure 5, in which case 200*b* has pairs of portions 220*a*,*b* which are inclined at the cylindrical corners thereof. The cutter parts rotate between the pairs of inclined portions 220*a*,*b*. Therefore, coffee-beans are ground thoroughly, since coffee-beans are continuously directed to the centre of the case by means of a reaction from hitting the inclined portions 220*a* and 220*b*.

A fourth embodiment of a mill is shown in Figure 6, in which at least a portion of the case 200*c* has an arched peripheral bottom 222. Coffee beans are ground thoroughly, since the grinder rotates vertically.

A fifth embodiment of a mill will be described with reference to Figures 7 and 8. In Figures 7 and 8, the case 200*d* is constructed in the form of an oval in side view. The case 200*d* has a circular periphery and includes a grinder 300*d* in it. The grinder 300*d* is constructed as a cutter plate 308 which is vertically disposed on the cutter support 302 and is rotated around the drive shaft 148 at the centre of the case. Both ends of the plate 308 are moved along the inner face of the periphery of the case to stir coffee-beans up and down. Coffee beans are continuously directed to the bottom of the case and are thoroughly ground, since the side-section of the case is an oval. After the use of the mill, the case 200*d* and the cover 202*d* are taken off from the frame 140 and then are washed such as in the first embodiment.

A sixth embodiment of a mill is shown in Figure 9. This embodiment is similar to the fifth embodiment of the mill. In this sixth embodiment, the grinder plate 308*a* has wings 310 extended horizontally therefrom. The wings 310 stir the coffee-beans up and down and grind them with the plate 308*a* to produce a homogeneous grind.

Figures 10 and 11 show a seventh embodiment of a mill construction according to the invention. Numeral 172 indicates a water storing tank which is constructed adjacent body frame 140*a*. The water storing tank 172 has an opening above it to receive water. The opening is covered by a tank cap 174. The water storing tank 172 is directly connected to one

end of the water supplying pipe 128' by a water supplying outlet 164*a*.

Numeral 150 is a storage area which is positioned below the motor 144 in the frame 140*a* of the body 100. The storage area is used for storing coffee-beans and other parts, i.e. an electric line cord for the coffee extractor, etc. Numeral 152 (Figure 10) is a door for the storage area 150. In the seventh embodiment, the frame 140*a* of the body is strong enough to hold the motor for the water storing tank, and the tank 172 is simple in ocnstruction since there is no valve mechanism. Further, a space in the frame is available as a storage area for storing coffee beans.

As is clear from the above description of coffee mill constructions, the drive shaft of the motor is disposed horizontally in order to rotate the grinder vertically within the case. Accordingly, coffee-beans are crushed uniformly in spite of the amount thereof, since they are stirred up and down by the grinder.

CLAIMS

1. A coffee mill construction comprising:
a housing;
a case, installed on said housing, for receiving coffee-beans;
an electric motor carried by said housing, said motor having a substantially horizontally disposed drive shaft extending into the case; and
a grinder, disposed on said drive shaft in the case and rotating vertically within the case for grinding said coffee-beans.

2. A coffee mill construction according to claim 1, wherein said grinder vertically rotates closely adjacent an inner surface of said case for crushing said coffee beans.

3. A coffee mill construction according to claim 1 or 2, wherein said motor is disposed horizontally on a frame of said housing so that said grinder rotates vertically.

4. A coffee mill construction according to any preceding claim, wherein said case has a horizontal cylindrical form and has a circular projection for removably securing same to said housing.

5. A coffee mill construction according to claim 2 or either of claims 3 and 4 as dependent on claim 2, wherein said grinder comprises cutter parts disposed parallel to said surface of the case, and an arm part arranged between each of said cutter parts and said drive shaft for securing said cutter parts.

6. A coffee mill construction according to claim 5, wherein each of said cutter parts has a folded member at both ends thereof.

7. A coffee mill consruction according to claim 4 or either of claims 5 and 6 as dependent on claim 4, wherein said case has inclined portions at upper and lower corners thereof.

8. A coffee mill construction according to any of claims 1 to 6, wherein said case has an arcuate bottom.

9. A coffee mill construction according to any of claims 1 to 3, wherein said case has the shape of an oval when viewed from one side and said grinder is composed of a vertically positioned cutter plate.

10. A coffee mill construction according to claim 9, wherein said cutter plate has horizontally extending wings.

11. A coffee mill construction according to any preceding claim, wherein said housing includes a water storing tank removably mounted below said motor.

12. A coffee mill construction according to any of claims 1 to 10, wherein said housing includes a storage area and a water storing tank.

13. A coffee mill construction, substantially in accordance with any embodiment herein described with reference to the accompanying drawings.

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