

HORIZONTAL ROTARY RECONSTITUTED MACHINE AND METHOD THEREOF FOR PREPARING DRINK

[0001] This application claims the benefit of priorities to Chinese Patent Application No. 201420758653.1 titled “HORIZONTAL ROTARY BREWING-TYPE DRINK MAKER”, filed with the Chinese State Intellectual Property Office on December 4, 2014, Chinese Patent Application No. 201420758223.X titled “HORIZONTAL BREWING-TYPE DRINK MAKER”, filed with the Chinese State Intellectual Property Office on December 4, 2014, and Chinese Patent Application No. 201410734145.4 titled “METHOD FOR PREPARING DRINK WITH HORIZONTAL ROTARY BREWING-TYPE DRINK MAKER”, filed with the Chinese State Intellectual Property Office on December 4, 2014, the entire disclosures of which are incorporated herein by reference.

FIELD

[0002] The present application relates to a drink maker and a method for preparing drink with the drink maker, and particularly to a horizontal rotary brewing-type drink maker and a method for preparing drink with the horizontal rotary brewing-type drink maker.

BACKGROUND

[0003] With the improvement of people’s living standards and the adjustment of people’s eating habits, more and more people drink tea, soybean milk or coffee, and consequently, brewing-type drink maker is more and more popular.

[0004] Currently, brewing-type drink makers on the market include vertical brewing-type machines and horizontal brewing-type machines. The vertical brewing-type drink maker generally refers to the machines in which the central axis of a capsule is vertically arranged, and the horizontal brewing-type drink maker generally refers to the machines in which the central axis of a capsule is horizontally arranged. The horizontal brewing-type drink maker generally includes a base having a brewing chamber, a brewing head, a water intake needle and a lead-out needle both horizontally arranged in the brewing head, a liquid supply mechanism for supplying liquid to the brewing head, a brewing cup, and a capsule

horizontally arranged in the brewing cup. The working manner of the horizontal brewing-type drink maker is described as follows. Liquid is injected into the capsule by the brewing head automatically, to mix the liquid with the material in the capsule and dissolves the material in the capsule, and then the lead-out needle leads out the prepared drink, thus achieving the preparation of drinks and facilitating user's use.

[0005] However, since the capsule is horizontally arranged, the drink powder in the capsule will be concentrated in a lower part, the water intake needle injects liquid flow straightly into the capsule, and a part of drink powder concentrated in the lower part is not flushed by the liquid flow, and thus is agglomerated and caked, causing that a large amount of drink powder remains in the capsule after the brewing process finishes in lots of cases, resulting in great waste and also adversely affects the nutrition and taste of the prepared drink. Further, the connection of the water intake needle and the liquid supply mechanism is inconvenient, thus the assembling and installation are not easy, which results in a low production efficiency and a high probability of water leakage, and may adversely affects the service life of the drink maker.

SUMMARY

[0006] An object of the present application is to provide a horizontal rotary brewing-type drink maker which has a good brewing effect and a simple structure, and to provide a method for preparing drinks with the drink maker.

[0007] In view of the above technical issues, a horizontal rotary brewing-type drink maker is provided according to the present application, which includes a base having a brewing chamber, a brewing head, a water intake needle arranged in the brewing head, a lead-out needle, a liquid supply mechanism configured to supply liquid to the brewing head and a brewing cup configured to accommodate the capsule. The brewing head has one end connected to the liquid supply mechanism and another end configured to provide the liquid into the capsule. The brewing head includes a main body, and the capsule includes a bottom wall, a side wall extending upward from the bottom wall and a diaphragm closing the capsule, and a central axis of each of the water intake needle, the lead-out needle and the capsule is horizontally arranged. A flow jetting direction of the water intake needle is arranged to intersect with the axis of the water intake needle and is directed towards the side

wall of the capsule, the lead-out needle is arranged below the water intake needle, the drink maker further includes a driving device mounted on the main body, and the driving device is configured to drive the water intake needle to rotate.

[0008] Further, an end, in communication with the liquid supply mechanism, of the water intake needle is provided with a water intake head, and the water intake head is integrally formed with the water intake needle.

[0009] Further, an included angle between the flow jetting direction of the water intake needle and the axis of the water intake needle is α , and $50\text{ degrees} \leq \alpha \leq 85\text{ degrees}$.

[0010] Further, the water intake head is connected to the liquid supply mechanism by a coupling, and the water intake head is inserted in the coupling and is rotatable in the coupling.

[0011] Further, a first sealing ring is provided between the water intake head and the coupling, and the first sealing ring is sleeved on the water intake head.

[0012] Further, the brewing head further includes a pressing plate, and the pressing plate is mounted on the main body and is provided with a through hole for allowing the water intake needle to pass through, a second sealing ring is provided between the water intake needle and the pressing plate, and the second sealing ring is arranged in the through hole of the pressing plate.

[0013] Further, the lead-out needle is arranged below the water intake needle, the lead-out needle is configured to pierce the diaphragm to form a pierced hole, and a distance between the pierced hole and the side wall of the capsule is $L1$, and $L1 \geq 2\text{ mm}$.

[0014] Further, an end, extending into the capsule, of the lead-out needle is beveled to form a needle tip, and a beveled portion of the needle tip forms a beveled surface, the beveled surface is arranged to face upwards, and a lead-out hole of the lead-out needle is arranged in the beveled surface.

[0015] Further, the water intake needle has a rotation speed ranging from 30 rpm to 250 rpm.

[0016] The method for preparing drinks with the above horizontal rotary brewing-type drink maker includes the following steps:

a water intake step: piercing the capsule by the water intake needle, and providing liquid into the capsule by the water intake needle;

a brewing step: driving the water intake needle to rotate by the driving device, forming a jet flow region by the water intake needle, and flushing drink powder in the jet flow region by liquid flow to mix and dissolve the drink powder; and

a drink discharging step: piercing the capsule by the lead-out needle, to lead a drink, formed by the finally dissolved drink powder, out of the capsule.

[0017] In the present application, the “jet flow region” refers to a trajectory of the movement of liquid flow when being driven by the rotation of the water intake needle to move, and the “central axis of the capsule being arranged horizontally” refers to that the central axis of the capsule is in a horizontal state or an approximately horizontal state; the “powder agglomerate” refers to an agglomerate with an outer surface being soaked and containing dried drink powder inside.

[0018] The present application has the following beneficial effects.

[0019] 1. The water intake needle injects around the central axis of the capsule, the flow jetting direction of the water intake needle intersects with the axis of the water intake needle and is directed towards the side wall of the capsule, the driving device of the drink maker drives the water intake needle to rotate, in this way, the jet flow generates a rotary jet flow movement around the central axis of the water intake needle, that is, the central axis of the capsule, to thereby enabling the liquid to be mixed with the drink powder and dissolve the drink powder, and accelerating the mixing and dissolving of the liquid and the drink powder, and the drink powder can be dissolved sufficiently without residue, thereby improving the taste and nutritive value of the drink. Especially, the rotating water intake needle can more easily form a tapered jet flow region around the center of the capsule, to allow the drink powder to be quickly and sufficiently mixed with and dissolved by the water stream jetted from the water intake needle. Further, the lead-out needle is arranged below the water intake needle, thus shortening the lead-out path of the drink, and further due to the effect of gravity, the discharging of the drink is speeded up and facilitated.

[0020] 2. Further, an end, in communication with the liquid supply mechanism, of the water intake needle is provided with a water intake head, and the water intake head is

integrally formed with the water intake needle by injection molding. Such arrangement has a simple structure, facilitates the connection between the water intake needle and the liquid supply mechanism, facilitates the assembling and mounting in production, improves the production efficiency, and also improves the reliability of the water intake needle in rotation, avoids water leakage, and thereby prolonging the service life of the machine.

[0021] 3. An included angle between the flow jetting direction of the water intake needle and the axis of the water intake needle is α , and $50 \text{ degrees} \leq \alpha \leq 85 \text{ degrees}$. Such arrangement ensures that the reversing point of the jet flow of the water intake needle is on the side wall of the capsule, to allow the jet flow of the water intake needle to generate a greater rotary jet flow movement, to enable the drink powder to be dissolved more quickly and sufficiently, thereby further improving the taste and nutritive value of the drink. In the case that α is less than 50 degrees, the reversing point of the water intake needle is not on the side wall of the capsule or is located at a lower portion of the side wall of the capsule, in this way, the jet flow generates a small rotary jet flow movement, and the drink brewing effect is poor. In the case that α is greater than 85 degrees, the reversing point of the water intake needle is located at a high portion of the side wall of the capsule, in this way, the jet flow, after being reversely deflected by the side wall, may be jetted toward the diaphragm of the capsule, however, most of the drink powder is located at the bottom wall of the capsule, thus causing insufficient dissolving of the drink powder, resulting in waste, and a poor taste of the drink.

[0022] 4. The water intake head is connected to the liquid supply mechanism by the coupling, and is rotatable in the coupling. This facilitates the connection between the water intake needle and the liquid supply mechanism, improves the reliability of the water intake needle in rotation, prevents the liquid from leaking, and prolongs the service life of the machine.

[0023] 5. The first sealing ring is provided between the water intake head and the coupling, and the sealing ring is sleeved on the water intake head, thus enhancing the sealing performance between the water intake head and the coupling, and preventing water leakage when the water intake needle is rotating.

[0024] 6. The second sealing ring is provided between the water intake needle and the pressing plate and the second sealing ring is arranged in the through hole of the pressing plate, thus preventing drink from entering a gap between the water intake needle and the

pressing plate during the drink brewing process, and avoiding bacteria from being bred, and improving the sanitarness.

[0025] 7. The lead-out needle pierces the diaphragm to form a pierced hole, and the distance between the pierced hole and the side wall of the capsule is $L1$, and $L1 \geq 2\text{mm}$. Thus, when the jet flow generates the rotary jet flow movement, the drink powder can pass through the space between the lead-out needle and the side wall of the capsule, and will not be blocked between the lead-out needle and the side wall of the capsule, thereby preventing hazards of explosions caused by a too high pressure in the capsule when the lead-out needle is blocked by the drink powder, and improving the operational safety. In the case that $L1$ is less than 2 mm, the drink powder is apt to be blocked between the lead-out needle and the side wall of the capsule, and may possibly block the lead-out needle, which may further cause hazards of explosions due to a too high pressure in the capsule.

[0026] 8. The end, extending into the capsule, of the lead-out needle is beveled to form a needle tip, the beveled portion of the needle tip forms a beveled surface, the beveled surface is arranged to face upwards, and a lead-out hole of the lead-out needle is arranged in the beveled surface. Thus, when the jet flow generates a rotary jet flow movement, the drink powder will not block the lead-out needle when passing through the space between the lead-out needle and the side wall of the capsule, thus avoiding hazards of explosions caused by a too high pressure in the capsule; moreover, it prevents the undissolved drink powder from being directly discharged, and thereby improving the taste of the drink.

[0027] 9. The rotation speed of the water intake needle is configured to range from 30 rpm to 250 rpm, thus not only ensuring that the drink powder can be sufficiently dissolved and the drink can have a good taste, but also ensuring a high brewing efficiency, and further, the lead-out needle is not apt to be blocked, which avoids hazards of explosions caused by a too high pressure in the capsule. In the case that the rotation speed is less than 30 rpm, the water intake needle rotates too slowly, the drink powder is dissolved slowly, and the drink brewing efficiency is low, moreover, the lead-out needle is apt to be blocked by the drink powder, and there are hazards of explosion of the capsule, therefore, it is not safe. In the case that the rotation speed is greater than 250 rpm, part of undissolved drink powder may be brought out from the lead-out needle by the liquid flow, which adversely affects the taste of the drink.

[0028] 10. In this drink preparation method, the flow jetting direction of the water intake

needle is arranged to intersect with the axis of the water intake needle, thus when being introduced by the water intake needle, the liquid flow is directed to flush the drink powder; and the brewing step is additionally provided with the process of using the driving device to drive the water intake needle to rotate, the water intake needle forms the jet flow region, and the drink powder is flushed by the liquid flow in the jet flow region, to thereby being mixed and dissolved, to accelerate the mixing and dissolving of liquid and drink powder, and the drink powder is sufficiently dissolved without residue, thereby improving the taste and nutritive value of the drink; moreover, the water intake needle generates a rotary jet flow movement during rotation, which better facilitates the dissolving of the drink powder and improves the brewing efficiency and taste of the drink.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] Figure 1 is a schematic view showing the structure of a first embodiment of a drink maker according to the present application;

[0030] Figure 2 is a schematic structural view showing the cooperation of a brewing head with a brewing head in the first embodiment of the drink maker according to the present application;

[0031] Figure 3 is a partially schematic view showing the cooperation of the brewing head with the brewing cup of the drink maker according to the present application;

[0032] Figure 4 is an enlarged view of part A in Figure 3; and

[0033] Figure 5 is a schematic view showing the structure of a second embodiment of the drink maker according to the present application.

[0034] Names of components in the drawings are as follows:

1	base,	2	brewing chamber,
3	brewing head,	31	main body,
32	pressing plate,	321	through hole,
4	water intake needle,	41	driven wheel,
42	water intake head,	5	lead-out needle,
6	liquid supply mechanism,	7	capsule,
8	brewing cup,	9	driving device,

- | | | | |
|----|---------------------------------------|-----|-----------------------------------|
| 91 | motor, | 92 | motor shaft, |
| 93 | driving wheel, | 10 | coupling, |
| 11 | mounting bracket, | 12 | first sealing ring, |
| 13 | second sealing ring, | 14 | third sealing ring, |
| 5 | 100 tapered straight jet flow region, | 110 | V-shaped reverse jet flow region. |

DETAILED DESCRIPTION

[0035] The present application is further described in detail hereinafter with reference to drawings and embodiments.

10 **[0036]** As shown in Figures 1 to 5, a horizontal rotary brewing-type drink maker is provided according to the present application, which includes a base 1, a brewing chamber 2, a brewing head 3, a water intake needle 4, a lead-out needle 5, a liquid supply mechanism 6, a capsule 7 and a brewing cup 8.

[0037] The brewing chamber 2 is arranged in the base 1, and the brewing head 3 is
 15 arranged at one end of the brewing chamber 2. The brewing head 3 includes a main body 31 and a pressing plate 32, and the pressing plate 32 is mounted on the main body 31 and is provided with a through hole 321 for allowing the water intake needle 4 to pass through. The brewing head 3 has one end connected to the liquid supply mechanism 6 and another end for providing liquid into the capsule 7. The capsule 7 includes a bottom wall, a side wall
 20 extending upward from the bottom wall and a diaphragm for closing the capsule. The water intake needle 4 and the lead-out needle 5 are arranged at the same side of the brewing head 5. The liquid supply mechanism 6 is arranged at one side of the base 1, and the brewing cup 8 is arranged at another side of the brewing chamber 2. The central axis of each of the water intake needle 4, the lead-out needle 5 and the capsule 7 is arranged horizontally, that is, the
 25 axis of each of the water intake needle 4 and the lead-out needle 5 is coincident with or in parallel with the central axis of the brewing head 3, and the central axis of the capsule 7 is in a horizontal state or an approximately horizontal state. The drink maker further includes a driving device 9, and the driving device 9 is configured to drive the water intake needle 4 to rotate, to accomplish the brewing of drinks.

30 **[0038]** A method for preparing drinks, applicable for the above drink maker, is further provided according to the present application, and the specific working process is described

as follows.

[0039] (1) A customer places the capsule 7 into the drink maker and presses a start button, and then the drink maker begins to work.

5 [0040] (2) A water intake step: the water intake needle 4 pierces the capsule 7 and supplies liquid into the capsule 7.

[0041] (3) A brewing step: the driving device 9 drives the water intake needle 4 to rotate, to form a tapered straight jet flow region 100 by taking the water intake needle 4 as the center, and the drink powder is flushed by the liquid flow in the tapered straight jet flow region 100 to be mixed and dissolved.

10 [0042] (4) A drink discharging step: the lead-out needle 5 pierces the capsule 7, to lead the drink, formed by the finally dissolved drink powder, out of the capsule.

[0043] In the above-described drink preparation method, a flow jetting direction of the water intake needle is arranged to intersect with the axis of the water intake needle, to allow the liquid flow, when being injected by the water intake needle, to flush towards the drink powder; and the brewing step is additionally provided with the process of using the driving device to drive the water intake needle to rotate, to form the jet flow region by the water intake needle, and thus, the drink powder is flushed by the liquid flow in the jet flow region, and thus is mixed and dissolved, which accelerates the mixing and dissolving of the liquid and the drink powder, and the drink powder is sufficiently dissolved without residue, thereby improving the taste and nutritive value of the drink. Moreover, the water intake needle generates a rotary jet flow movement during rotation, which better facilitates the dissolving of the drink powder and improves the brewing efficiency and the taste of the drink.

[0044] The present application is further described in detail by two embodiments and drawings thereof.

25 **FIRST EMBODIMENT**

[0045] As shown in Figures 1 and 4, a horizontal rotary brewing-type drink maker is provided according to this embodiment, which includes a base 1, a brewing chamber 2, a brewing head 3, a water intake needle 4, a lead-out needle 5, a liquid supply mechanism 6, a capsule 7 and a brewing cup 8. The brewing chamber 2 is arranged in the base 1, and the brewing head 3 is arranged at one end of the brewing chamber 2. The brewing head 3

includes a main body 31 and a pressing plate 32, and the pressing plate 32 is mounted on the main body 31 and is provided with a through hole 321 for allowing the water intake needle 4 to pass through. The brewing head 3 has one end connected to the liquid supply mechanism 6 and another end for providing liquid into the capsule 7. The capsule 7 includes a bottom wall, a side wall extending upward from the bottom wall and a diaphragm for closing the capsule. The water intake needle 4 and the lead-out needle 5 are arranged at the same side of the brewing head 5. The liquid supply mechanism 6 is arranged at one side of the base 1, and the brewing cup 8 is arranged at another side of the brewing chamber 2. The central axis of each of the water intake needle 4, the lead-out needle 5 and the capsule 7 is arranged horizontally, that is, the axis of each of the water intake needle 4 and the lead-out needle 5 is coincident with or in parallel with the central axis of the brewing head 3, and the central axis of the capsule 7 is in a horizontal state or an approximately horizontal state. The flow jetting direction of the water intake needle 4 is arranged to intersect with the axis of the water intake needle 4 and is directed towards the side wall of the capsule 7, thus, the jet flow generates a rotary jet flow movement around the axis of the water intake needle, to allow the liquid to be mixed with the drink powder and dissolve the drink powder, and accelerate the mixing and dissolving of the liquid and the drink powder, and the drink powder can be dissolved sufficiently without residue, thereby improving the taste and nutritive value of the drink.

[0046] In this embodiment, a water intake head 42 is arranged at an end, in communication with the liquid supply mechanism 6, of the water intake needle 4, and the water intake head 42 is integrally formed with the water intake needle 4 by injection molding. Such arrangement has the following advantages, it has a simple structure, facilitates the connection between the water intake needle and the liquid supply mechanism, facilitates the assembling and mounting in production, improves the production efficiency, and also improves the reliability of the water intake needle in rotation, avoids water leakage, thereby prolonging the service life of the machine.

[0047] The water intake head 42 is connected to the liquid supply mechanism via a coupling 10, and the water intake head 42 is inserted into the coupling 10 and is rotatable in the coupling 10. This facilitates the connection between the water intake needle and the liquid supply mechanism, improves the reliability of the water intake needle in rotation, and at the same time prevents water leakage, thereby prolonging the service life of the machine.

[0048] The drink maker further includes a driving device 9. The driving device 9 is a motor, which drives the water intake needle 4 to rotate to accomplish the brewing of the drink. A first sealing ring 12 is provided between the water intake head 42 and the coupling 10. The first sealing ring 12 is annular, and the material of the sealing ring 12 may be silicone gel. The water intake head 42 is provided with an annular groove, and the first sealing ring 12 is sleeved on the annular groove. Such arrangement has the following advantages, by providing the first sealing ring between the water intake head and the coupling and sleeving the first sealing ring on the water intake head, the sealing performance between the water intake head and the coupling is enhanced, thereby preventing water leakage when the water intake needle is rotating.

[0049] A second sealing ring 13 is provided between the water intake needle 4 and the pressing plate 32. The second sealing ring 13 is annular, and the material of the second sealing ring 13 may be silicone gel. The second sealing ring 13 is arranged in the through hole 321 of the pressing plate 32. By providing the second sealing ring between the water intake needle and the pressing plate and arranging the second sealing ring in the through hole of the pressing plate, it may prevent the drink from entering a gap between the water intake needle and the pressing plate when brewing the drink, to avoid bacteria from being bred, thereby improving sanitarness.

[0050] The pressing plate 32 is further provided with a third sealing ring 14 for sealing the brewing cup 8, the third sealing ring 14 is a semi-closed annular structure and has a U-shaped longitudinal section. A lower end of the pressing plate 32 is provided with an annular groove, and the third sealing ring 14 is mounted in the annular groove. An opening of the U-shaped third sealing ring 14 is fixed in the annular groove, and the bottom of the U-shaped third sealing ring 14 is in contact with the brewing cup 8 and seals the brewing cup 8. Such arrangement has the following advantages, the third sealing ring is a semi-closed structure and has the U-shaped longitudinal section, thus, the third sealing ring can generate a large deformation, and can acquire a small deformation coefficient, which can not only ensure a reliable sealing between the brewing head and the brewing cup and avoid leakage in the case that no capsule is placed in the brewing cup, but also ensure that the pressing force has a small increase when the compression amount increases in the case that the capsule is placed in the brewing cup. The opening of the U-shaped third sealing ring is fixed in the annular groove, and the bottom of the U-shaped third sealing ring is in contact with the

brewing cup and seals the brewing cup, which further allows the third sealing ring to generate a large deformation, and reduces the pressing force generated when placing the capsule, and the liquid will not enter the third sealing ring from the opening of the U shape, thereby ensuring sanitairiness.

5 **[0051]** The material of the lead-out needle 5 may be plastic. An end, extending into the capsule 7, of the lead-out needle 5 is beveled to form a needle tip, and the beveled portion of the needle tip forms a beveled surface, and the beveled surface is arranged to face upwards. Such arrangement has the following advantages. When the jet flow generates rotary jet flow movement, the drink powder will not block the lead-out needle when passing through a
10 space between the lead-out needle and the side wall of the capsule, thus avoiding hazards of explosion caused by a too high pressure in the capsule. Moreover, the undissolved drink powder can be prevented from being directly discharged, and thus improving the taste of the drink.

[0052] The lead-out needle 5 is arranged right below the water intake needle 4, and the
15 lead-out needle 5 is spaced from the water intake needle 4. The lead-out needle 5 pierces the diaphragm to form a pierced hole, and the distance between the pierced hole and the side wall of the capsule 7 is $L1$, and $L1 \geq 2\text{mm}$. Such arrangement has the following advantages, the lead-out needle is arranged right below the water intake needle, which facilitates discharging the drink. Further, the distance between the lead-out needle and the side wall of
20 the capsule is $L1$, and $L1 \geq 2\text{mm}$, in this way, when the jet flow generates the rotary jet flow movement, the drink powder can pass through the space between the lead-out needle and the side wall of the capsule, and will not be blocked between the lead-out needle and the side wall of the capsule, thereby avoiding hazards of explosion caused by a too high pressure in the capsule when the lead-out needle is blocked b the drink powder, and improving the
25 operational safety. In the case that $L1$ is less than 2 mm, the drink powder is apt to be blocked between the lead-out needle and the side wall of the capsule, and may possibly block the lead-out needle, and further may cause hazards of explosion caused by a too high pressure in the capsule. In this embodiment, $L1=4.5\text{mm}$, of course, optionally, $L1$ may be 2 mm, 2.5 mm, 3 mm, 3.5 mm, 4 mm, 5 mm, 5.5 mm, 6 mm, 6.5 mm, 7 mm, 7.5 mm, 8 mm,
30 8.5 mm, 9 mm, 9.5 mm, 10 mm, and etc., $L1$ may be any value as long as $L1$ is greater than 2mm, which will not be enumerated here, and the above listed values are only preferred embodiments, and are not intended to limit the scope of $L1$.

[0053] As shown in Figures 3 and 4, the material of the water intake needle 4 may be plastic. An end, extending into the capsule, of the water intake needle 4 is provided with a needle tip, and the needle tip is formed by beveling the end of the water intake needle 4. An injection hole of the water intake needle 4 is arranged in a side wall of the end, extending
5 into the capsule 7, of the water intake needle 4. The injection hole is circular, the diameter of the injection hole of the water intake needle 4 is D, and $0.8\text{ mm} \leq D \leq 2\text{ mm}$. Such arrangement has the following advantages, it enables the jet flow to generate a best rotary jet flow movement, to allow the drink powder to be dissolved quicker and better, thereby improving the brewing effect of the drink. In the case that D is less than 0.8 mm, the flow rate may be
10 reduced, which will adversely affect the brewing effect, moreover, the pressure inside the machine is too high, which will adversely affect the sealing performance, and may adversely affect the service life of the machine. In the case that D is greater than 2 mm, the dimension of the injection hole is too large, which may reduce the linear velocity of the jet flow, and the flushing force is reduced, and the brewing effect is degraded. In this embodiment, D is 1.2
15 mm, of course, optionally, D may be 0.8 mm, 0.9 mm, 1 mm, 1.1 mm, 1.3 mm, 1.4 mm, 1.5 mm, 1.6 mm, 1.7 mm, 1.8 mm, 1.9 mm, or 2 mm.

[0054] The distance from the reversing point at which the jet flow of the water intake needle 4 impinges on the side wall of the capsule 7 to the diaphragm of the capsule 7 is L2, and the height of the capsule 7 is H, $L2 < H$, and L2 ranges from 0.2H to 0.8H. Such
20 arrangement has the following advantages, it enables the jet flow of the water intake needle to generate a greater rotary jet flow movement, to allow the drink powder to be dissolved more quickly and sufficiently, thereby further improving the taste and nutritive value of the drink. Further, L2 ranges from 0.2H to 0.8H, this ensures that the jet flow of the water intake needle can be reversely deflected by the side wall of the capsule, to generate the best rotary
25 jet flow movement, to allow the drink powder to be better and quicker dissolved. In the case that L2 is less than 0.2H, the reversing point of the water intake needle is not on the side wall of the capsule or is located at a lower portion of the side wall of the capsule, in this way, the rotary jet flow movement generated by the jet flow is small, and the brewing effect of the drink is poor. In the case that L is greater than 0.8H, the reversing point of the water intake
30 needle is located at a high portion of the side wall of the capsule, in this way, the jet flow, after being reversely deflected by the side wall, will be jetted towards the diaphragm of the capsule, however, most of the drink powder is located at the bottom wall of the capsule, thus

the drink powder cannot be dissolved sufficiently, resulting in wastes and a poor taste of the drink.

[0055] The length by which the water intake needle 4 extends into the capsule 7 is L_3 , and $L_3 < L_2$. Such arrangement has the following advantages, it ensures that the jet flow of the water intake needle, after being jetted toward the side wall of the capsule, is reversely deflected towards the bottom wall of the capsule, thus preventing part of the drink powder from being flushed to the diaphragm of the capsule and failing to be dissolved in which case the drink powder is wasted and the concentration and taste of the drink are degraded.

[0056] An included angle between the flow jetting direction of the water intake needle 4 and the axis of the water intake needle 4 is α , and $50^\circ \leq \alpha \leq 85^\circ$. Such arrangement has the following advantages, it ensures that the reversing point of the jet flow of the water intake needle is on the side wall of the capsule, to allow the jet flow of the water intake needle to generate a greater rotary jet flow movement, to enable the drink powder to be dissolved more quickly and sufficiently, thereby further improving the taste and nutritive value of the drink. In the case that α is less than 50 degrees, the reversing point of the water intake needle is not on the side wall of the capsule or is located at a lower portion of the side wall of the capsule, in this way, the jet flow generates a small rotary jet flow movement, and the drink brewing effect is poor. In the case that α is greater than 85 degrees, the reversing point of the water intake needle is located at a high portion of the side wall of the capsule, in this way, the jet flow, after being reversely deflected by the side wall, may be jetted toward the diaphragm of the capsule, however, most of the drink powder is located at the bottom wall of the capsule, thus causing insufficient dissolving of the drink powder, resulting in waste, and a poor taste of the drink. In this embodiment, α is 75 degrees, of course, optionally, α may be 50 degrees, 53 degrees, 55 degrees, 58 degrees, 60 degrees, 63 degrees, 65 degrees, 68 degrees, 70 degrees, 73 degrees, 78 degrees, 80 degrees, 83 degrees or 85 degrees.

[0057] The rotation speed of the water intake needle 4 ranges from 30 rpm to 250 rpm, which not only ensures that the drink powder can be sufficiently dissolved and the drink can have a good taste, but also ensures a high brewing efficiency, and further, the lead-out needle is not apt to be blocked, which avoids hazards of explosions caused by a too high pressure in the capsule. In the case that the rotation speed is less than 30 rpm, the water intake needle

rotates too slowly, the drink powder is dissolved slowly, and the drink brewing efficiency is low, moreover, the lead-out needle is apt to be blocked by the drink powder, and there are hazards of explosion of the capsule, therefore, it is not safe. In the case that the rotation speed is greater than 250 rpm, part of undissolved drink powder may be brought out from the lead-out needle by the liquid flow, which adversely affects the taste of the drink. In this embodiment, the water intake needle has a rotation speed of 140 rpm, of course, the optional rotation speed may be 30 rpm, 40 rpm, 50 rpm, 60 rpm, 70 rpm, 80 rpm, 90 rpm, 100 rpm, 110 rpm, 120 rpm, 130 rpm, 150 rpm, 160 rpm, 170 rpm, 180 rpm, 190 rpm, 200 rpm, 210 rpm, 220 rpm, 230 rpm, 240 rpm or 250 rpm.

10 **[0058]** The material of the lead-out needle 5 may be plastic. An end, extending into the capsule 7, of the lead-out needle 5 is beveled to form a needle tip, the beveled portion of the needle tip forms a beveled surface, and the beveled surface is arranged to face upwards, and a lead-out hole of the lead-out needle 5 is arranged in the beveled surface. Such arrangement has the following advantages. When the jet flow generates the rotary jet flow movement, the
15 drink powder will not block the lead-out needle when passing through the space between the lead-out needle and the side wall of the capsule, thus avoiding hazards of explosions caused by a too high pressure in the capsule. Moreover, it prevents the undissolved drink powder from being directly discharged, thereby improving the taste of the drink. Further, the material of the lead-out needle is plastic, which facilitates the manufacturing and producing of the
20 lead-out needle, and reduces the cost.

[0059] It may be appreciated that, the material of the water intake needle may be stainless steel.

[0060] It may be appreciated that, the lead-out needle may be arranged below the water intake needle.

25 **[0061]** It may be appreciated that, the lead-out needle may be arranged at the bottom of the brewing cup.

[0062] It may be appreciated that, the material of the lead-out needle may be stainless steel.

[0063] The method for preparing drink according to this embodiment has a specific
30 working process as follows.

[0064] (1) A customer places the capsule 7 into the drink maker, and presses a start button, and then the drink maker begins to work.

[0065] (2) A water intake step: the water intake needle 4 pierces the capsule 7 and supplies liquid into the capsule 7.

5 **[0066]** (3) A brewing step: the driving device 9 drives the water intake needle 4 to rotate, to form a tapered straight jet flow region 100 by taking the water intake needle 4 as the center. After part of the drink powder is soaked, a paste layer is formed on the surface of the drink powder and then the drink powder forms powder agglomerates, and the powder agglomerates are continuously flushed by the liquid flow in the tapered straight jet flow
10 region 100, meanwhile, the liquid flow forming the tapered straight jet flow region 100 is reversely deflected by the side wall of the capsule 7 during rotation, to form a V-shaped reverse jet flow region 110, and the drink powder is flushed in the tapered straight jet flow region 100 and the V-shaped reverse jet flow region 110 together, where, after part of the drink powder is soaked, a paste layer is formed on the surface of the drink powder and then
15 the drink powder forms powder agglomerates, and the powder agglomerates are continuously flushed by the liquid flow in the tapered straight jet flow region 100 and the V-shaped reverse jet flow region 110, and are further broken up or diminished, and then the broken or diminished powder agglomerates are further flushed by the liquid flow in the jet flow region, and are finally dissolved.

20 **[0067]** (4) A drink discharging step: the lead-out needle 5 pierces the capsule 7, to lead the drink, formed by the finally dissolved drink powder, out of the capsule.

[0068] The above drink maker uses this method to prepare drinks, thus, when brewing the drink powder, after part of the drink powder is soaked, a paste layer is formed on the surface of the drink powder and then the drink powder forms powder agglomerates, and by
25 configuring the brewing step to further including the process of continuously rotating the water intake needle to form the jet flow region, the powder agglomerates are continuously flushed by the liquid flow in the jet flow region, to be further broken up or diminished, and the broken or diminished powder agglomerates are further flushed by the liquid flow in the jet flow region to be finally dissolved, the drink powder is further dissolved sufficiently, and
30 the taste, concentration and nutritive value of the drink are improved. The V-shaped reverse jet flow region is formed by the jet flow of the tapered straight jet flow region being

reversely deflected by the side wall of the capsule during rotation, in this way, the drink powder can be flushed by the liquid flow for multiples times, and further the brewing path of the drink powder is lengthened, thereby further better dissolving and more sufficiently dissolving the drink powder, and further improving the taste, concentration and nutritive value of the drink.

[0069] Of course, the brewing process is extremely complicated, and because the brewing effect is related to other factors such as pressure of the liquid flow, for example, the pressure of the liquid flow when the liquid flow enters the capsule may be changed as the environment temperature or other factors, causing that powder agglomerates may be formed in the brewing process, and powder agglomerates may be not formed, or the number and size of the formed powder agglomerates may be different.

SECOND EMBODIMENT

[0070] The difference between this embodiment and the first embodiment is the structure of the driving device.

[0071] As shown in Figure 5, the drink maker further includes a driving device 9, and the driving device 9 drives the water intake needle 4 to rotate to accomplish the brewing of the drink. The driving device 9 is mounted on the main body 31 and is located at one side of the water intake needle 4. The driving device 9 includes a motor 91, a motor shaft 92 and a driving wheel 93 sleeved on the motor shaft 92. A driven wheel 41 drivably connected to the driving wheel 93 is sleeved on the water intake needle 4. The driving wheel 93 is a spur gear, and the driven wheel 41 is a spur gear. The driving wheel 93 engages with the driven wheel 41 to drive the water intake needle 4 to rotate, to achieve the brewing of the drink powder. Such arrangement has the following advantages, by providing the driving device to drive the water intake needle to rotate, the jet flow of the water intake needle is enabled to form the tapered straight jet flow region, to allow the drink powder to be quickly and sufficiently dissolved, thereby further improving the taste and nutritive value of the drink.

[0072] In this embodiment, the material of the water intake needle 4 may be plastic, the driven wheel 41 is sleeved on an outer surface of the water intake needle 4, and the driven wheel 41 is integrally formed with the water intake needle 4 by injection molding. Such arrangement has the following advantages, the water intake needle is provided with the driven wheel drivably connected to the driving device, and the driven wheel is integrally

formed with the water intake needle, thus, the water intake needle has a simple structure and a high strength, and can be easily manufactured, and one stage of cooperation between the water intake needle and the driven wheel is omitted, which improves the precision of cooperation between the water intake needle and the driving device, enables the transmission to be more accurate, and also reduces the noise in transmission, and improves the user experience of the user.

[0073] The drink maker further includes a mounting bracket 11 for mounting the motor 91 and the driving wheel 92, the motor 91 is mounted on the mounting bracket 11 by screws, and the mounting bracket 11 is mounted on the main body 31 by screws. Such arrangement has the following advantages, by providing the mounting bracket, the motor and the driving wheel are assembled and mounted together, thus improving the precision of cooperation between the components, and allowing the structure to be more compact, and reducing the noise in transmission.

[0074] Of course, it may be appreciated that, the driving wheel 93 may be a belt pulley, and the driven wheel 41 may be a belt pulley, and the driving wheel 93 is drivably connected to the driven wheel 41 by a belt, thereby driving the water intake needle 4 to rotate. By using the belt transmission, the transmission is smooth, the structure is simple, the cost is low, and the machine is convenient to use and maintain.

[0075] It may be appreciated that, the driving wheel may be a helical gear, and the driven wheel may be a helical gear.

[0076] It may be appreciated that, the driving wheel may be a worm, and the driven wheel may be a worm wheel.

[0077] The structure and beneficial effects of this embodiment which are not described are the same as those of the first embodiment, which will not be described here in detail.

[0078] Unlike the method of the first embodiment, in a drink preparation method of this embodiment, the brewing step may further include a preliminary dissolving process, and the specific working process of the drink preparation method of this embodiment is described as follows.

[0079] (1) A customer places the capsule 7 into the drink maker, and presses a start button, and then the drink maker begins to work.

[0080] (2) A water intake step: the water intake needle 4 pierces the capsule 7, and supplies liquid into the capsule 7.

[0081] (3) A brewing step: the water intake needle 4 introduces liquid into the capsule 7, and the liquid dissolves the drink powder preliminary, to dissolve a part of the drink powder first, which increases a rolling space for liquid flow in the capsule, and allows the introduced liquid flow to generate an effective rolling in the capsule, to further enable the drink powder to be sufficiently dissolved without any residue. The driving device 9 drives the water intake needle 4 to rotate to form a tapered straight jet flow region 100 by taking the water intake needle 4 as the center, and the liquid flow forming the tapered straight jet flow region 100 is reversely deflected by the side wall of the capsule 7 during rotation, to form a V-shaped reverse jet flow region 110, and the drink powder is flushed in the tapered straight jet flow region 100 and the V-shaped reverse jet flow region 110 together, where, after part of the drink powder is soaked, a paste layer is formed on the surface of the drink powder and then the drink powder forms powder agglomerates, and the powder agglomerates are continuously flushed by the liquid flow in the tapered straight jet flow region 100 and the V-shaped reverse jet flow region 110, and are further broken up or diminished, and then the broken or diminished powder agglomerates are further flushed by the liquid flow in the jet flow region, and are finally dissolved. In this way, the drink powder can be flushed by the liquid flow for multiple times, and the brewing path of the drink powder is also lengthened, thus further enabling the drink powder to be better and more sufficiently dissolved, thereby further improving the taste, concentration and nutritive value of the drink.

[0082] (4) A drink discharging step: the lead-out needle 5 pierces the capsule 7, to lead the drink, formed by the finally dissolved drink powder, out of the capsule.

[0083] The above drink maker uses this method to prepare drinks, after the water intake needle introduces liquid into the capsule, the liquid first dissolves the drink powder preliminarily to obtain a large rolling space, and then is jetted around the central axis of the capsule. Thus, when brewing the drink powder, after part of the drink powder is soaked, a paste layer is formed on the surface of the drink powder and then the drink powder forms powder agglomerates, and by configuring the brewing step to further including the process of continuously rotating the water intake needle to form the jet flow region, the powder agglomerates are continuously flushed by the liquid flow in the jet flow region, to be further

broken up or diminished, and the broken or diminished powder agglomerates are further flushed by the liquid flow in the jet flow region to be finally dissolved, the drink powder is further dissolved sufficiently, and the taste, concentration and nutritive value of the drink are improved. The V-shaped reverse jet flow region is formed by the jet flow of the tapered
5 straight jet flow region being reversely deflected by the side wall of the capsule during rotation, in this way, the drink powder can be flushed by the liquid flow for multiples times, and further the brewing path of the drink powder is lengthened, thereby further better dissolving and more sufficiently dissolving the drink powder, and further improving the taste, concentration and nutritive value of the drink.

- 10 **[0084]** The above described embodiments are only preferred embodiments of the present application, and are not intended to limit the scope of implementation of the present application. All equivalent variations and modifications made based on the present application are covered by the scope of claims of the present application, and are not listed here in detail.

What is claimed is:

1. A horizontal rotary brewing-type drink maker, comprising a base having a brewing chamber, a brewing head, a water intake needle arranged in the brewing head, a lead-out needle, a liquid supply mechanism configured to supply liquid to the brewing head and a
5 brewing cup configured to accommodate the capsule, wherein the brewing head has one end connected to the liquid supply mechanism and another end configured to provide the liquid into the capsule, the brewing head comprises a main body, and the capsule comprises a bottom wall, a side wall extending upward from the bottom wall and a diaphragm closing the capsule, and a central axis of each of the water intake needle, the lead-out needle and the
10 capsule is horizontally arranged, and wherein a flow jetting direction of the water intake needle is arranged to intersect with the axis of the water intake needle and is directed towards the side wall of the capsule, the lead-out needle is arranged below the water intake needle, the drink maker further comprises a driving device mounted on the main body, and the driving device is configured to drive the water intake needle to rotate.

15 2. The drink maker according to claim 1, wherein an end, in communication with the liquid supply mechanism, of the water intake needle is provided with a water intake head, and the water intake head is integrally formed with the water intake needle.

20 3. The drink maker according to claim 1, wherein an included angle between the flow jetting direction of the water intake needle and the axis of the water intake needle is α , and $50\text{ degrees} \leq \alpha \leq 85\text{ degrees}$.

25 4. The drink maker according to claim 2, wherein the water intake head is connected to the liquid supply mechanism by a coupling, and the water intake head is inserted in the coupling and is rotatable in the coupling.

30 5. The drink maker according to claim 4, wherein a first sealing ring is provided between the water intake head and the coupling, and the first sealing ring is sleeved on the water intake head.

6. The drink maker according to claim 1, wherein the brewing head further comprises a pressing plate, and the pressing plate is mounted on the main body and is provided with a through hole for allowing the water intake needle to pass through, a second sealing ring is provided between the water intake needle and the pressing plate, and the second sealing ring is arranged in the through hole of the pressing plate.

7. The drink maker according to claim 1, wherein the lead-out needle is configured to pierce the diaphragm to form a pierced hole, and a distance between the pierced hole and the side wall of the capsule is L_1 , and $L_1 \geq 2$ mm.

8. The drink maker according to claim 1, wherein an end, extending into the capsule, of the lead-out needle is beveled to form a needle tip, and a beveled portion of the needle tip forms a beveled surface, the beveled surface is arranged to face upwards, and a lead-out hole of the lead-out needle is arranged in the beveled surface.

9. The drink maker according to claim 1, wherein the water intake needle has a rotation speed ranging from 30 rpm to 250 rpm.

10. A method for preparing drink with the horizontal rotary brewing-type drink maker according to any one of claims 1 to 9, comprising the following steps:

a water intake step: piercing the capsule by the water intake needle, and providing liquid into the capsule by the water intake needle;

a brewing step: driving the water intake needle to rotate by the driving device, forming a jet flow region by the water intake needle, and flushing drink powder in the jet flow region by liquid flow to mix and dissolve the drink powder; and

a drink discharging step: piercing the capsule by the lead-out needle, to lead a drink, formed by the finally dissolved drink powder, out of the capsule.