



US 20130142918A1

(19) **United States**

(12) **Patent Application Publication**  
Ye et al.

(10) **Pub. No.: US 2013/0142918 A1**

(43) **Pub. Date: Jun. 6, 2013**

(54) **BEVERAGE SUBSTANCE CARTRIDGE,  
FILTERING APPARATUS, BEVERAGE  
PRODUCING EQUIPMENT, BEVERAGE  
PRODUCING SYSTEM AND BEVERAGE  
PRODUCING METHOD**

**Publication Classification**

(51) **Int. Cl.**  
*A47J 31/40* (2006.01)  
(52) **U.S. Cl.**  
CPC ..... *A47J 31/407* (2013.01)  
USPC ..... *426/126; 99/295; 426/106; 426/431*

(75) Inventors: **Yangsheng Ye**, Shanghai (CN); **Yusheng Shi**, Shanghai (CN)

(73) Assignee: **TEATEK CO., LTD.**, Putuo District, Shanghai (CN)

(57) **ABSTRACT**

The invention provides a beverage substance cartridge, a tea filtering apparatus, a beverage producing equipment, a beverage producing system and a beverage producing method to solve the problem in the present technology that people eat tea leaf powder when drinking tea from present tea brewing equipment and it is troublesome to clear away tea leaf powder in the equipment. The invention could efficiently filter tea leaves and get rid of the trouble of clearing away used tea leaves manually. The beverage substance cartridge is used in conjunction with the tea filtering apparatus, the piercing point of the triangular pyramid structure could pierce the sealing cover of the beverage substance cartridge and then form matrix-shaped filtering holes in the sealing cover, brewed tea water could flow out, and used tea leaf is left in the extracting cartridge, so the filtering process is simple and convenient without clearing away tea leaves manually.

(21) Appl. No.: **13/698,715**

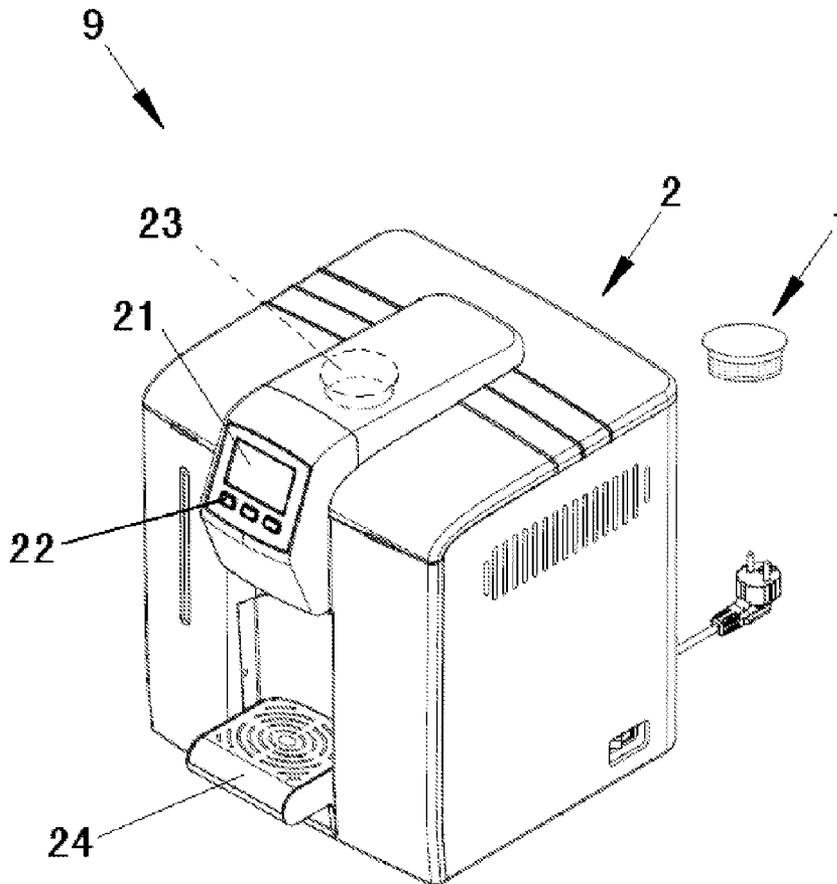
(22) PCT Filed: **May 19, 2011**

(86) PCT No.: **PCT/CN2011/074344**

§ 371 (c)(1),  
(2), (4) Date: **Jan. 29, 2013**

(30) **Foreign Application Priority Data**

May 20, 2010 (CN) ..... 201010179507.X  
May 20, 2010 (CN) ..... 201010179518.8  
May 21, 2010 (CN) ..... 201010181098.7  
May 21, 2010 (CN) ..... 201020201394.4  
May 21, 2010 (CN) ..... 201020201426.0



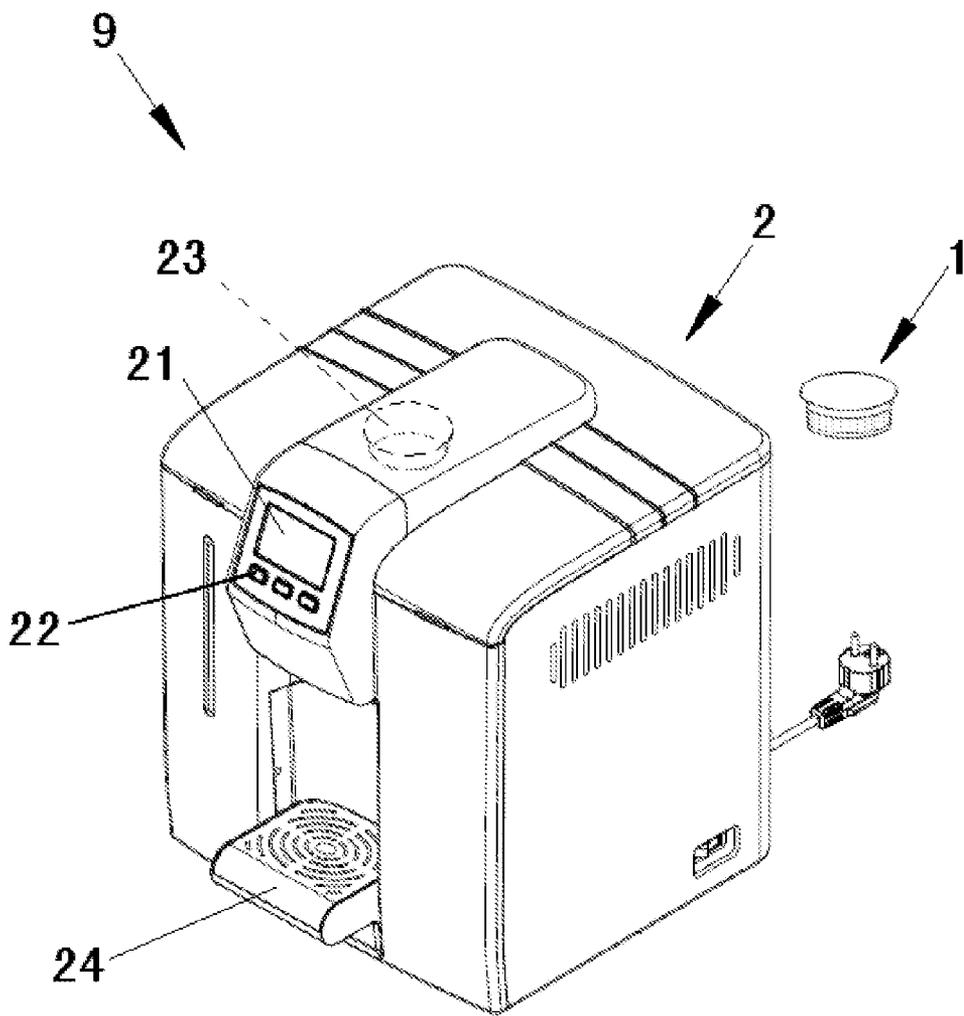


FIG.1

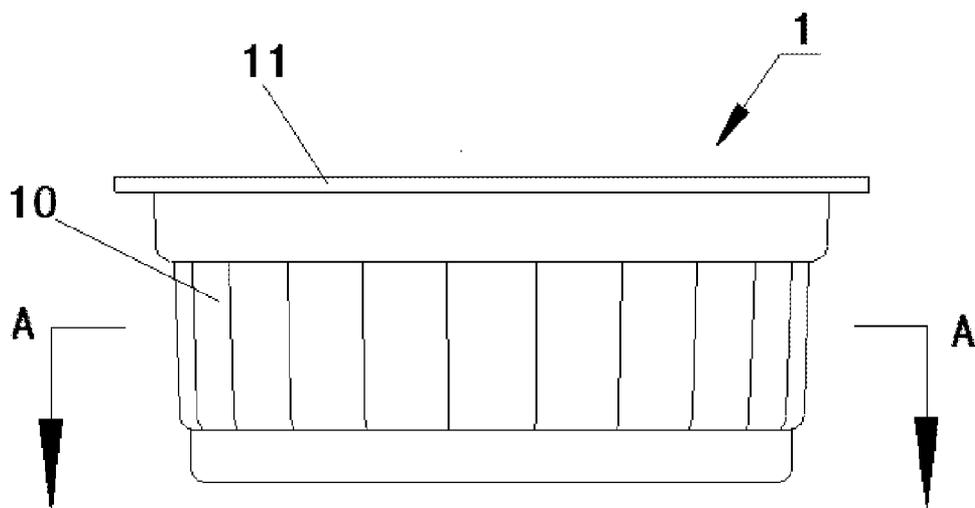


FIG. 2

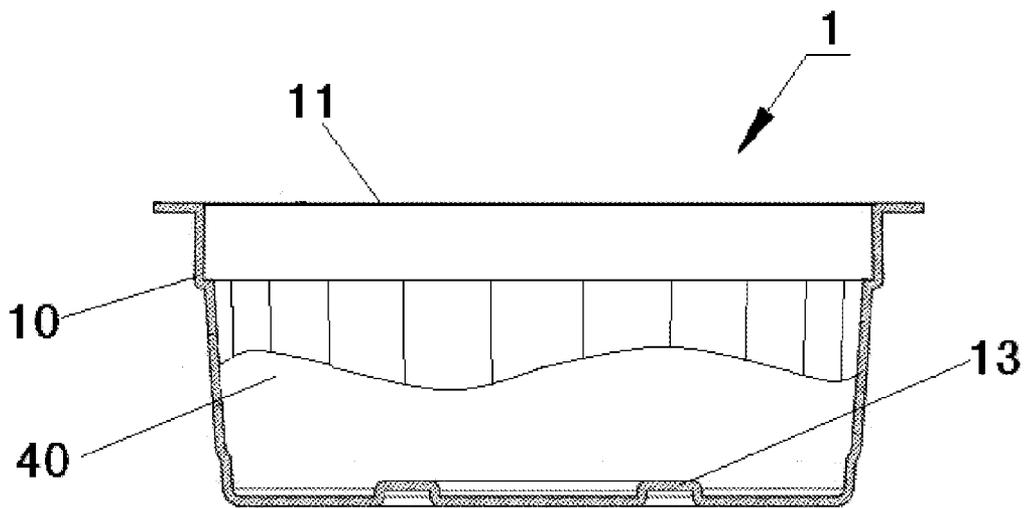


FIG. 3

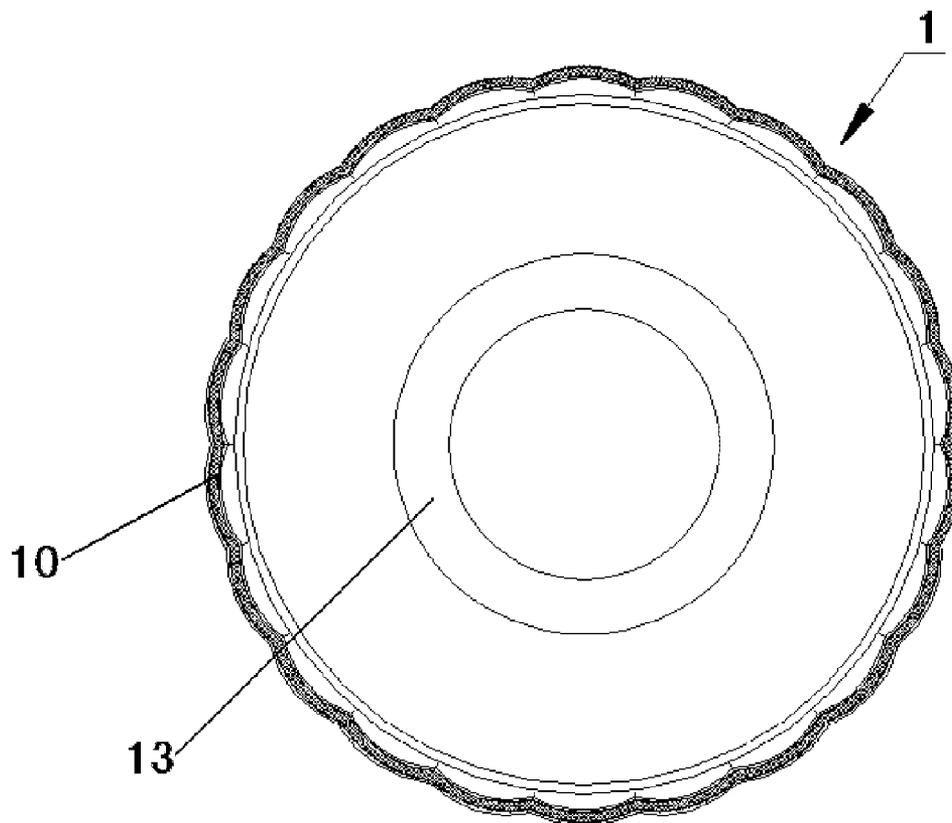


FIG.4

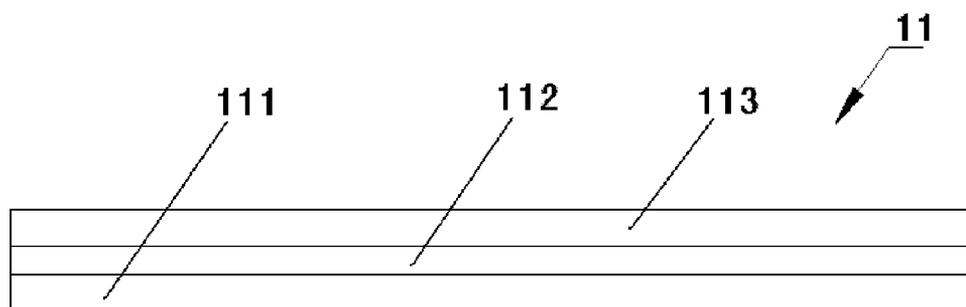


FIG.5

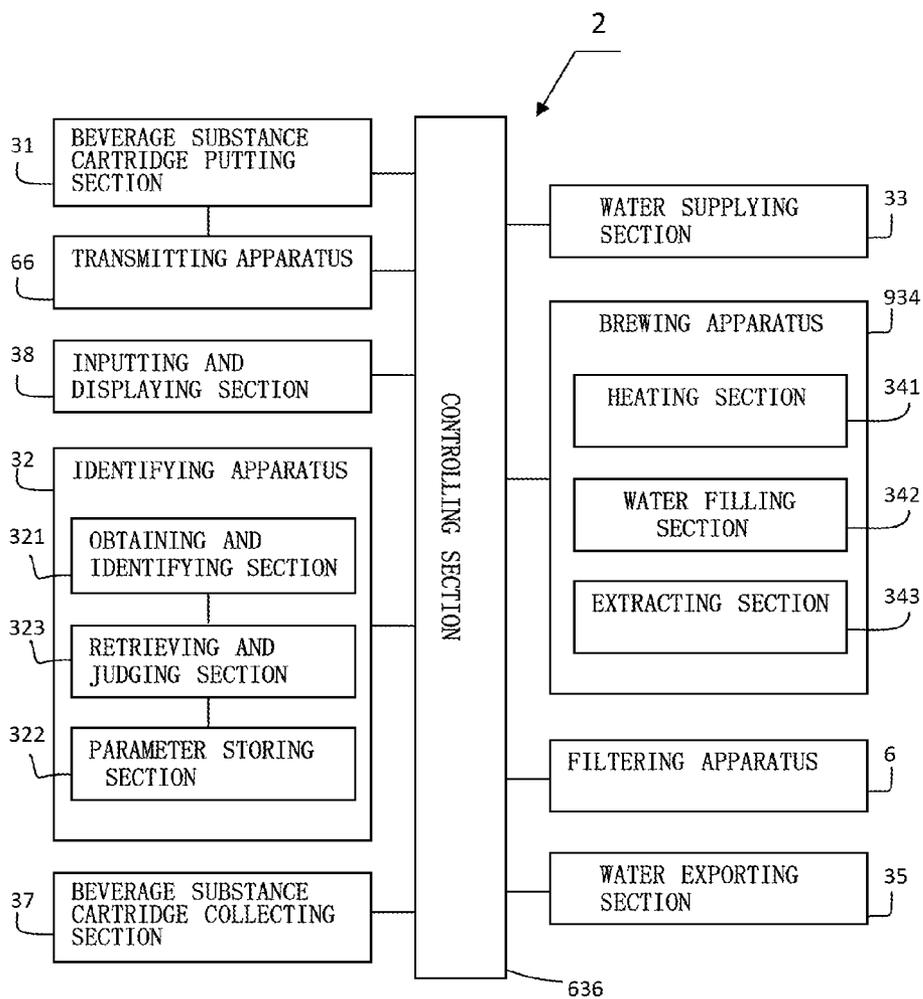


FIG 6

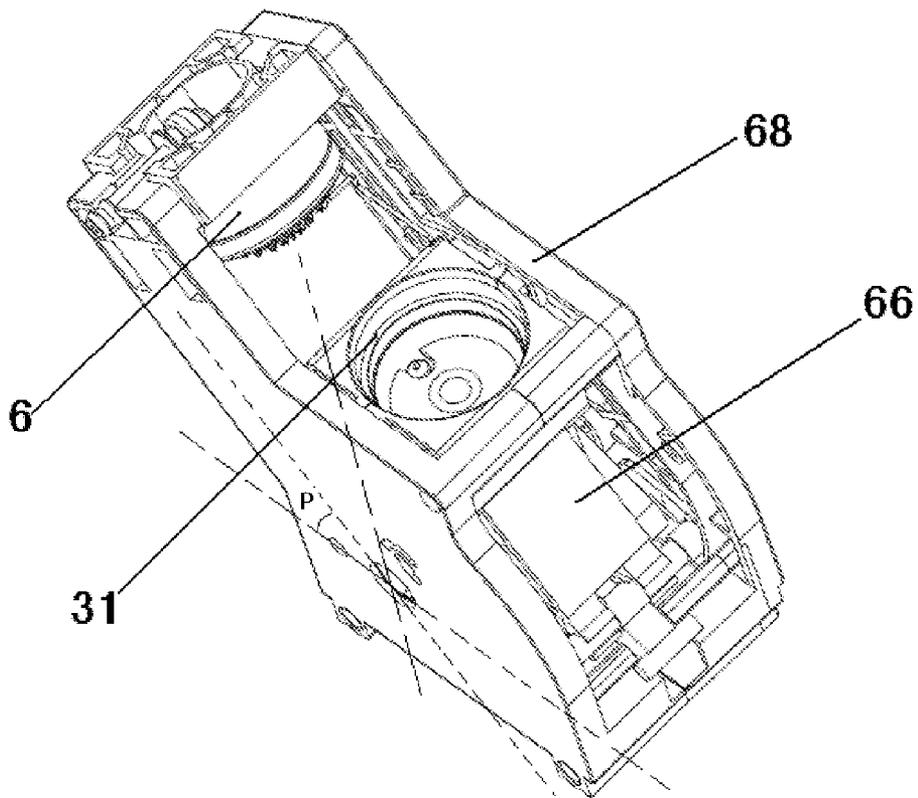


FIG. 7

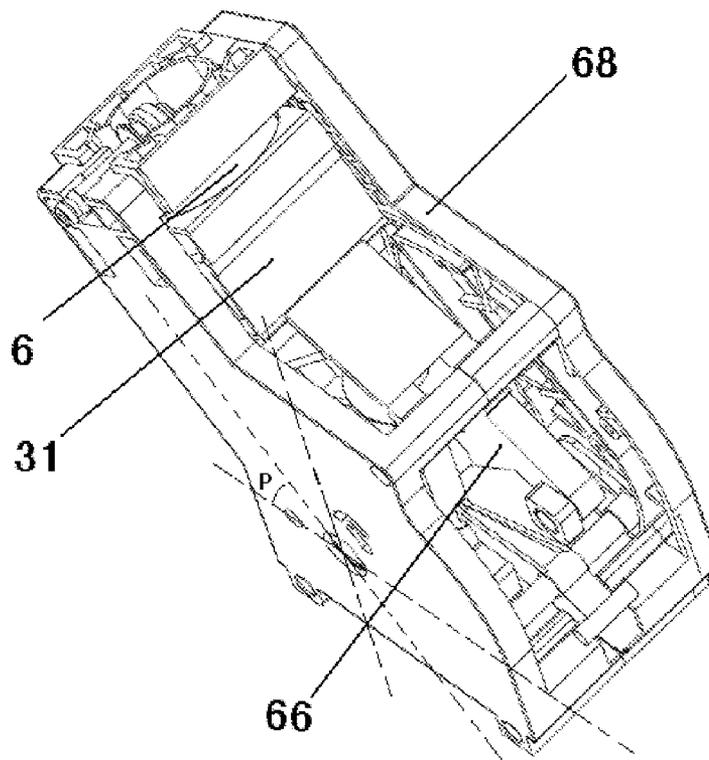
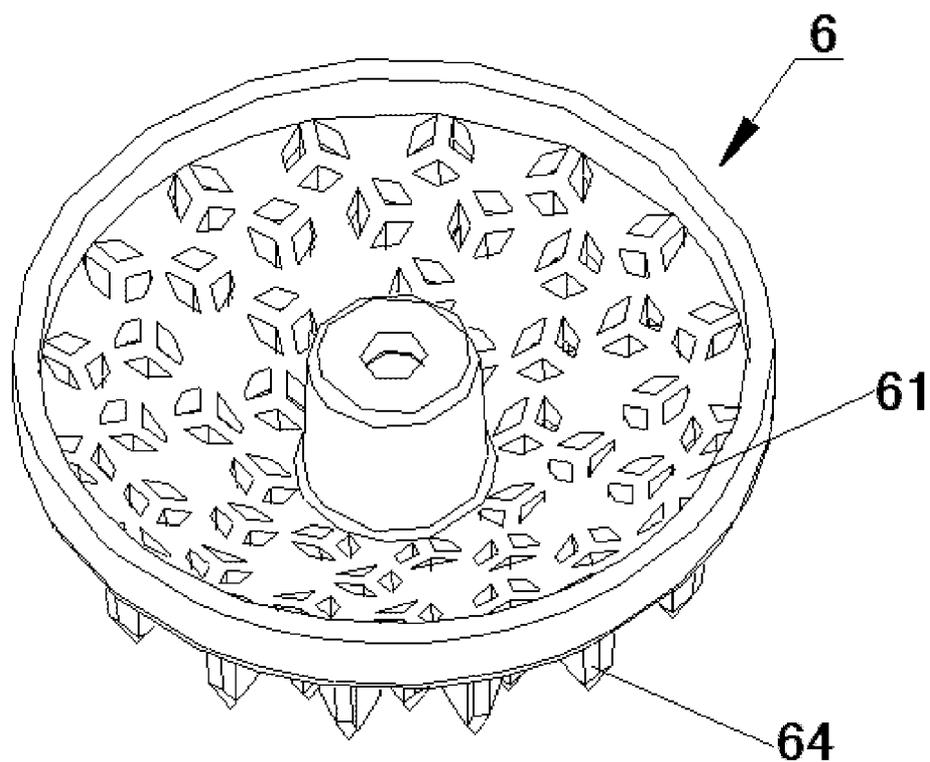
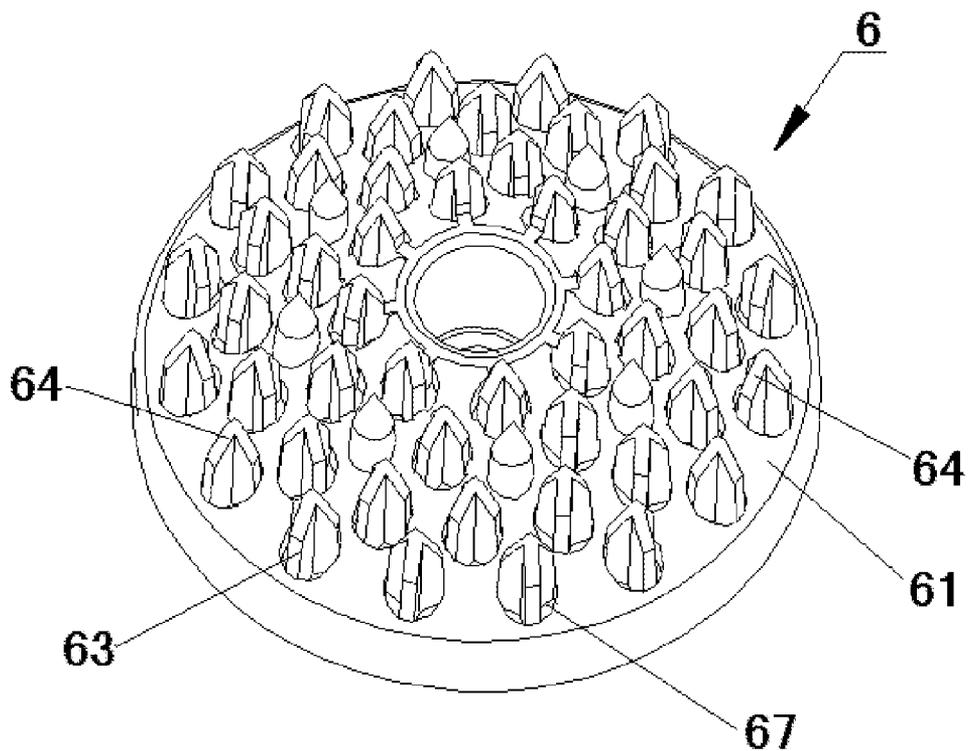


FIG. 8



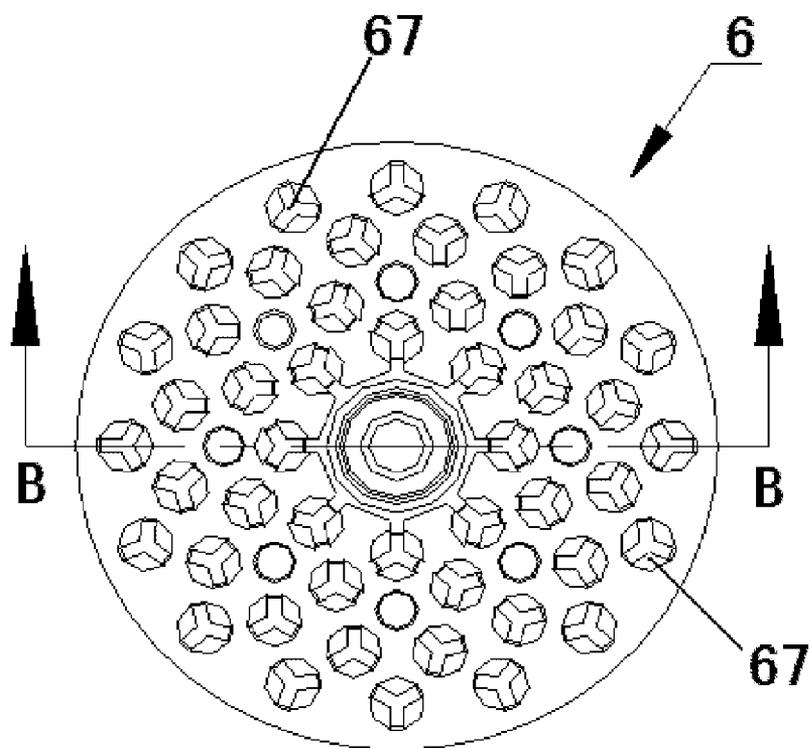


FIG. 11

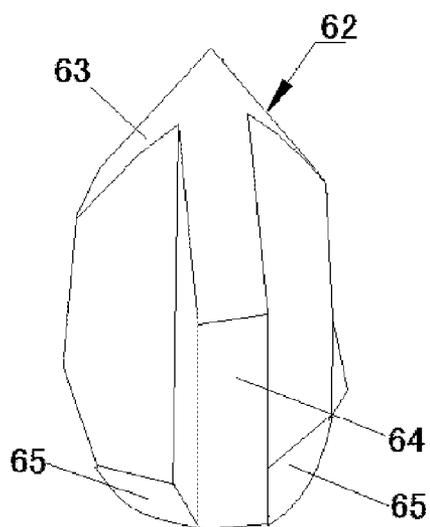


FIG. 12

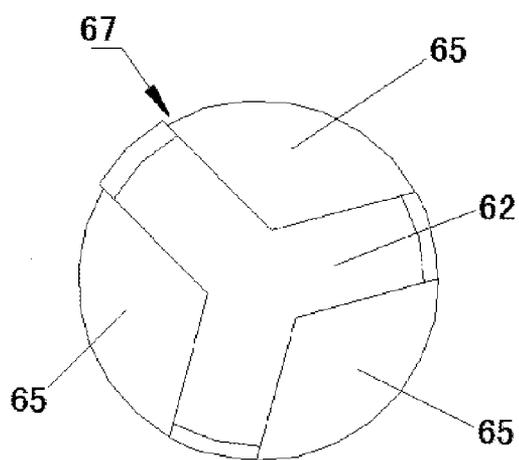


FIG. 13

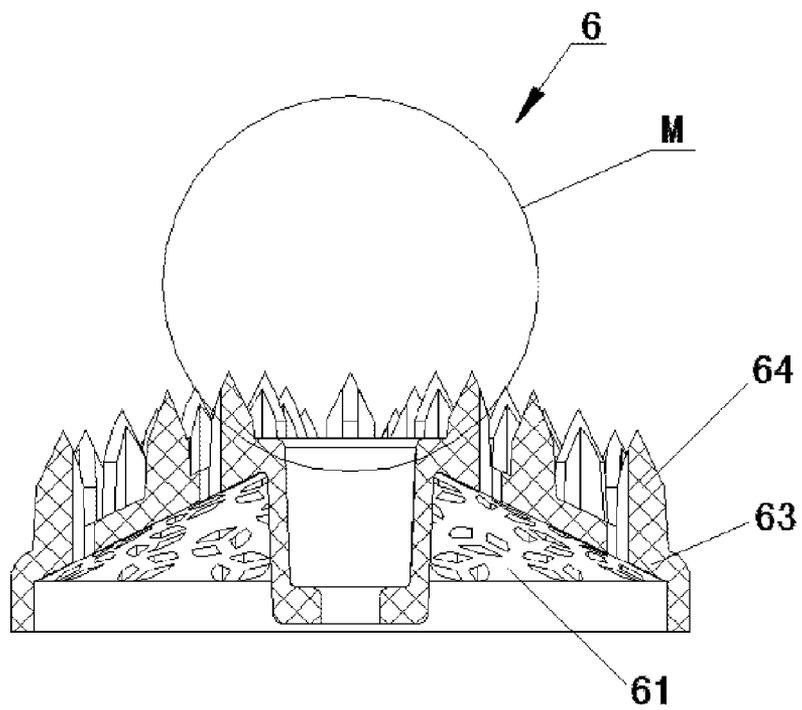


FIG. 14

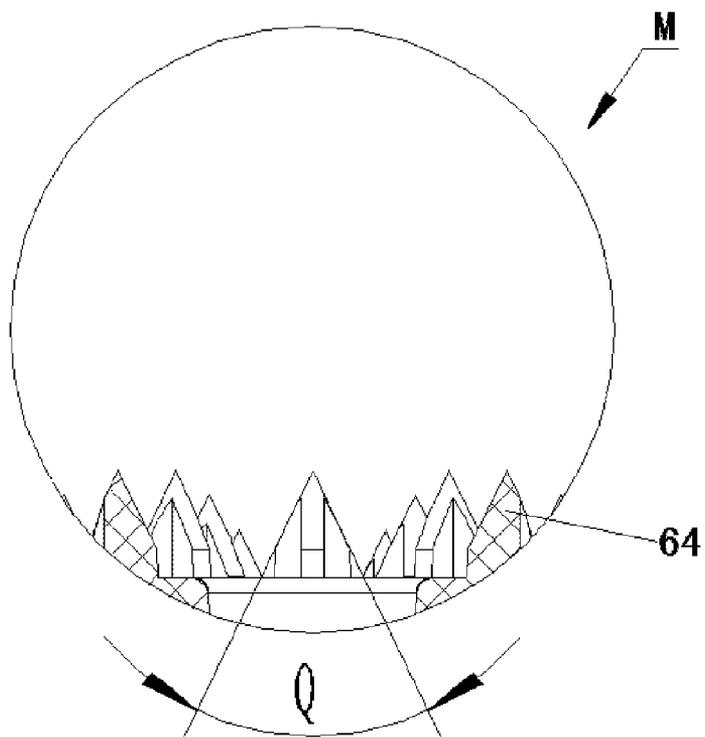


FIG. 15

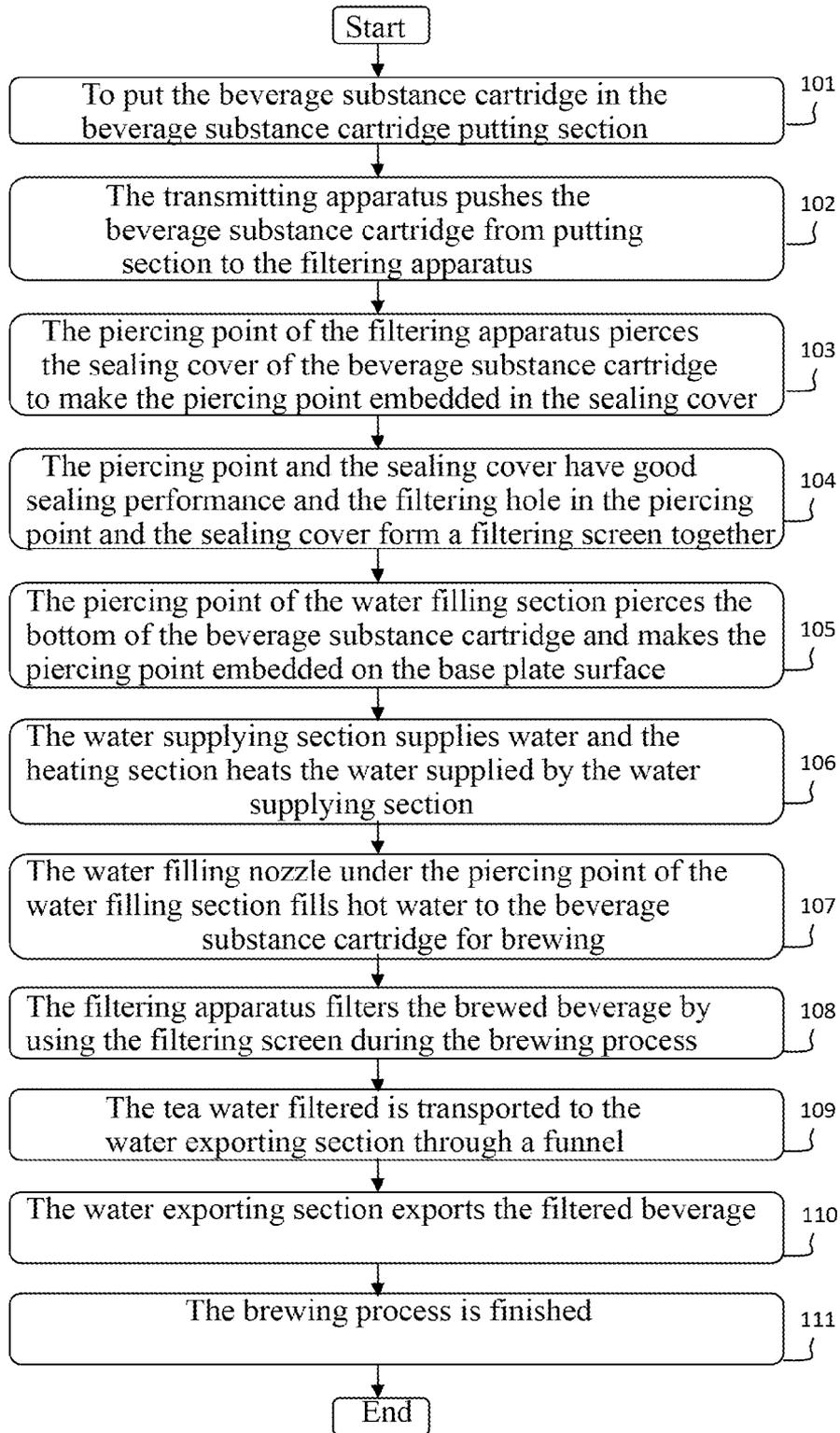


Fig.16

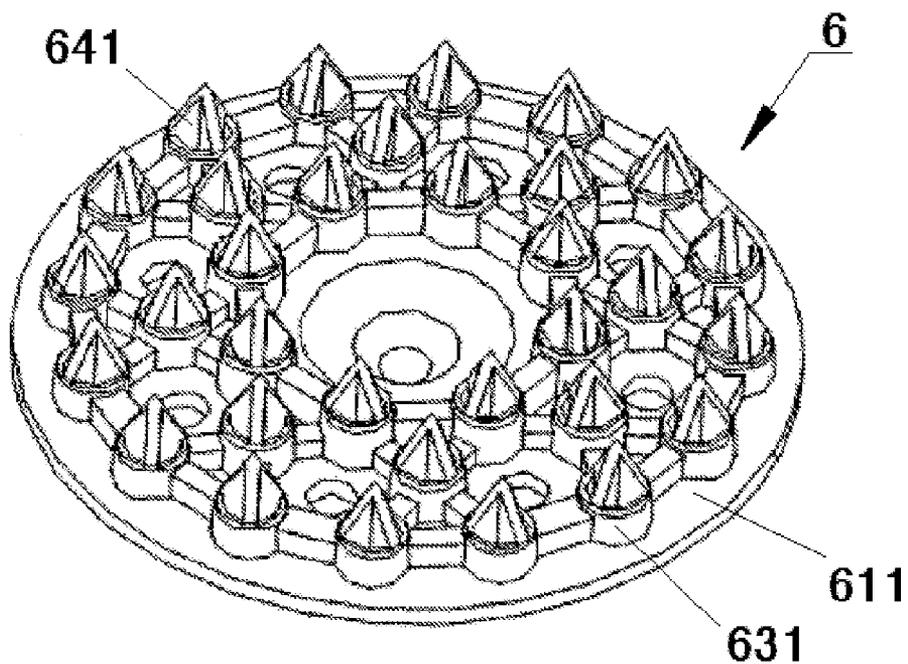


FIG. 17

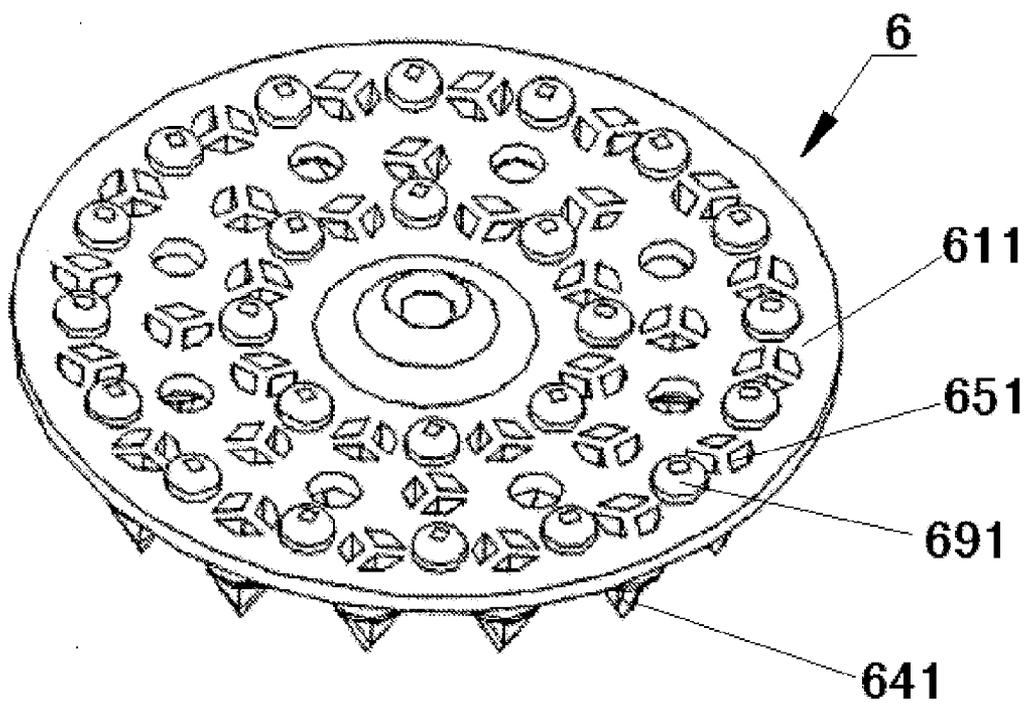


FIG. 18

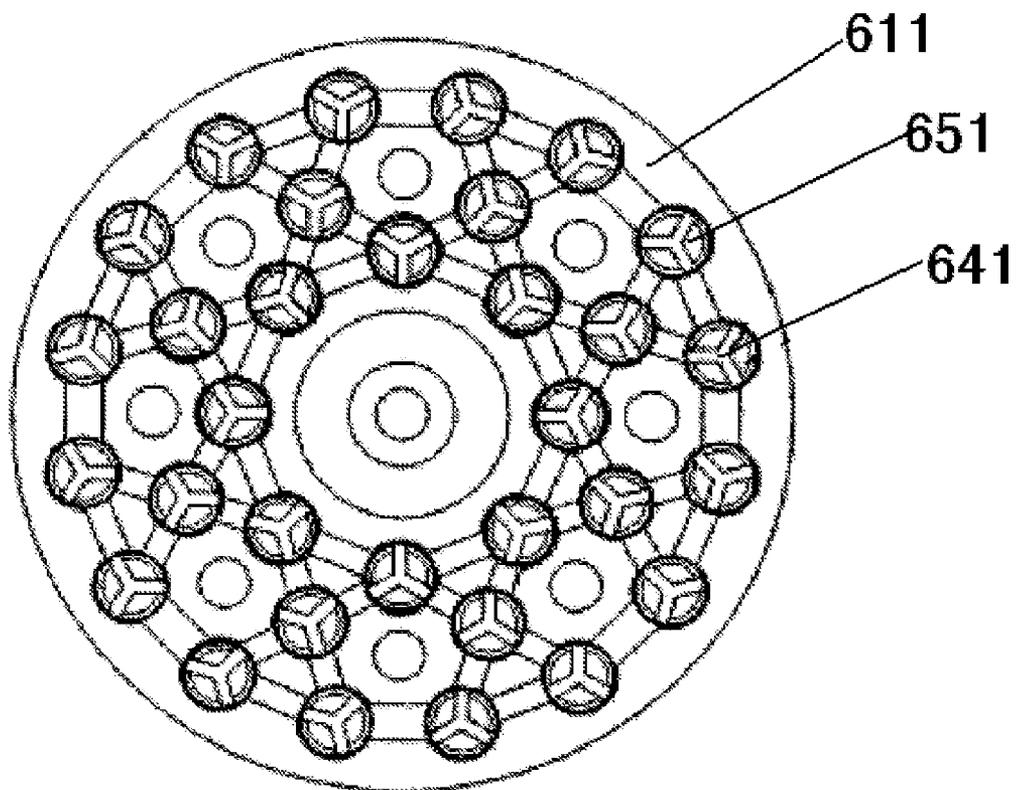


FIG. 19

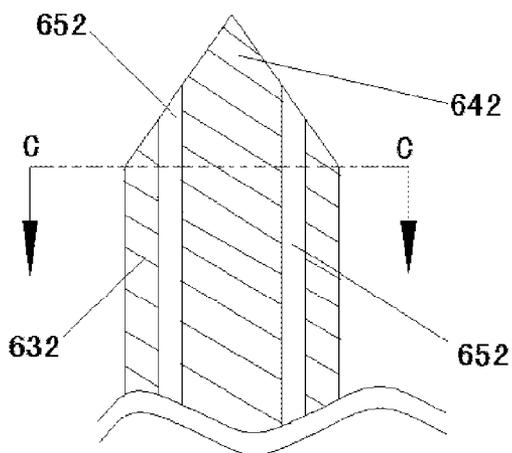


FIG. 20

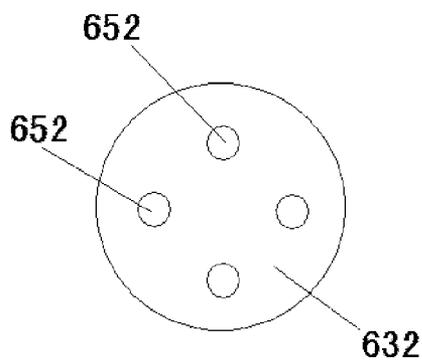


FIG. 21

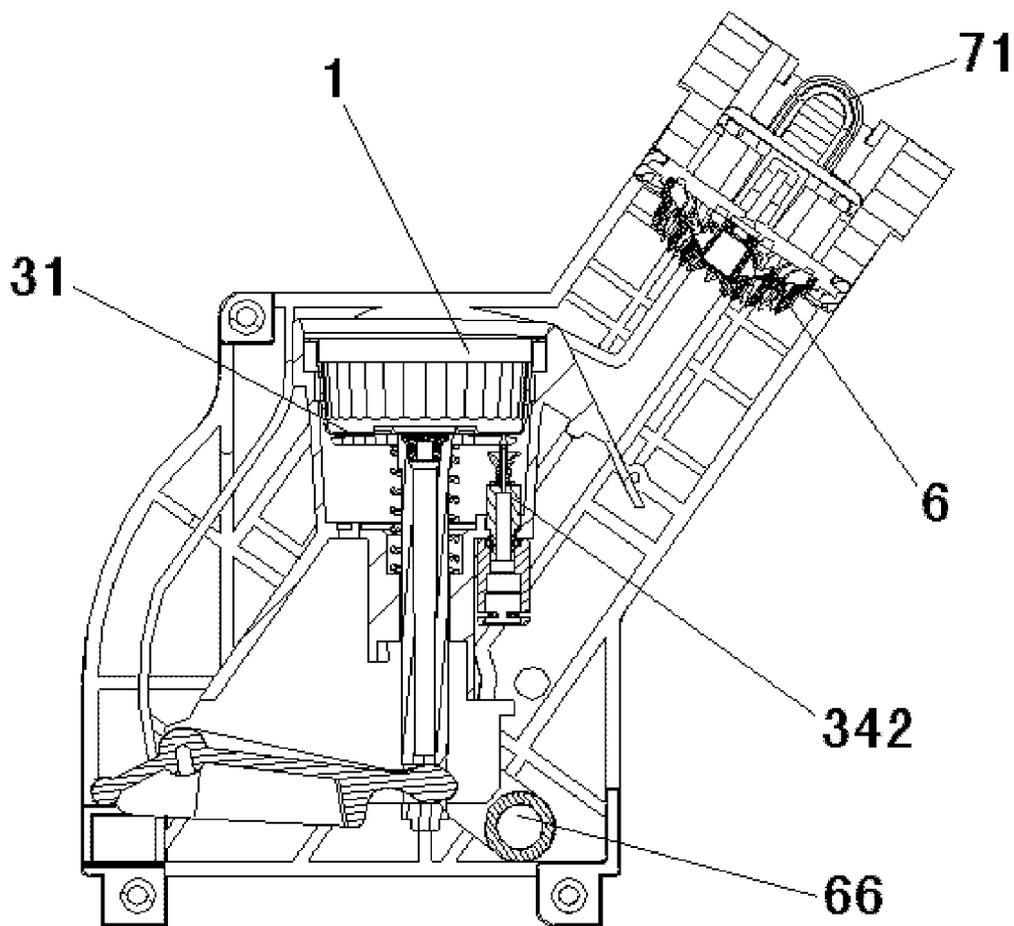


FIG.22

**BEVERAGE SUBSTANCE CARTRIDGE,  
FILTERING APPARATUS, BEVERAGE  
PRODUCING EQUIPMENT, BEVERAGE  
PRODUCING SYSTEM AND BEVERAGE  
PRODUCING METHOD**

**BACKGROUND OF THE INVENTION**

**[0001]** 1. Field of the Invention

**[0002]** The invention relates to a beverage producing field, specially a kind of beverage substance cartridge, an identifying apparatus, a beverage producing equipment, a beverage producing system and a beverage producing method.

**[0003]** 2. Related Background Art

**[0004]** Drinking tea and tasting tea is a long-lasting tradition in China. People drinking tea frequently not only could cultivate their taste, but also prolong their life. Especially there are over 100 tea leaf varieties in China, every variety has its unique characteristics, and different brewing methods are for different tea leaf varieties to exert different advantages of every variety during brewing. For example, there are different requirements for water temperatures, brewing times and time.

**[0005]** Meanwhile, traditional tea drinking way is to put tea leaves directly into a tea pot which is then filled with hot water for brewing and then to drink tea, but the inconvenience is that all the process is handled and controlled manually, and this could be realized by people with pretty much spare time or professional tea tasters, while it is too time-consuming for people at offices who want to drink tea.

**[0006]** In order to realize automatic tea brewing, a very simple automatic tea brewing equipment with a single function is designed (for example, refer to the Chinese invention patent with patent application number 200410041385.2). The invention has a cup-shaped filtering screen used to filter tea leaf, but the cup-shaped filtering screen has relatively large meshes which could only filter some comparatively large tea leaves, so small and fine tea leaf powder is mixed into tea water.

**[0007]** No matter through manual tea making or an automatic tea brewing equipment, brewed tea water is always mixed with tea leaves, people always eat tea leaf powder when drinking tea, tea leaf powder in a tea brewing equipment or a tea set has to be cleared away afterwards, and the whole process operation is pretty troublesome.

**SUMMARY OF THE INVENTION**

**[0008]** It is, therefore, an object of the invention to provide a beverage substance cartridge, a filtering apparatus, a beverage producing equipment, a beverage producing system and a beverage producing method to solve the troublesome problem of the present technology that people eat tea leaf powder when drinking tea brewed from a tea brewing equipment and have to clear away tea leaf powder in the equipment afterwards.

**[0009]** In order to realize the above mentioned objects, the invention has adopted the following technical plan:

**[0010]** There is provided a beverage substance cartridge comprising a cartridge body which accommodates substance for beverage production and a sealing cover to seal the substance in the cartridge body, and the sealing cover includes at least two layers of sealing film made of different material.

**[0011]** The sealing cover consists three layers of the sealing film, and the three layers of sealing film are an inner layer of sealing film, a middle layer of sealing film and an outer layer

of sealing film, which are in sequence from inside of cartridge body to outside. The inner layer of sealing film is made of polypropylene material, the middle layer of sealing film is made of aluminum foil material, and the outer layer of sealing film is made of polyethylene terephthalate material.

**[0012]** The substance is any one of or a combination of at least two of tea leaf, dried vegetable, dried fruit and Chinese medicinal herb.

**[0013]** There is provided a filtering apparatus which provides a filtering function for the beverage substance cartridge comprising a base plate corresponding to the shape of the beverage substance cartridge. On the front surface of base plate, plural piercing components set evenly, which could pierce the sealing cover of the beverage substance cartridge, the piercing component includes a piercing base which sets on the base plate and a piercing point which is forming integrated with the piercing base, and the base plate is set with plural filtering holes.

**[0014]** The front surface of the base plate is a convex arc surface.

**[0015]** The piercing point is a multi-edge pyramid, the piercing base is a multi-edge cylinder, and plural filtering holes run through piercing points, the piercing base and the base plate.

**[0016]** The piercing point is a multi-edge pyramid, the piercing base is a cylinder, and plural filtering holes run through the piercing points, the piercing base and the base plate.

**[0017]** The piercing point is a cone, the piercing base is a cylinder, and plural filtering holes run through the piercing points, the piercing base and the base plate.

**[0018]** The piercing point is a polygonal pyramid, the piercing base is a polygonal cylinder, and plural filtering holes run through the base plate.

**[0019]** The piercing point is a polygonal pyramid, the piercing base is a cylinder, and plural filtering holes run through the piercing base and the base plate.

**[0020]** The piercing point is a polygonal pyramid, the piercing base is a multi-edge cylinder, and plural filtering holes run through the piercing base and the base plate.

**[0021]** The piercing point is of triangular pyramid structure, the piercing base is a triangular prismoid, the filtering hole is set between two adjacent edges on the base plate, and three filtering holes are set at the root of every piercing point.

**[0022]** Further the material of the filtering apparatus is aluminum or polypropylene plastic.

**[0023]** There is provided a beverage producing equipment which uses the beverage substance cartridge for beverage production comprising:

**[0024]** A beverage substance cartridge putting section to put the beverage substance cartridge;

**[0025]** A water supplying section which supply water for beverage production;

**[0026]** A brewing apparatus to brews the substance into beverage;

**[0027]** A filtering apparatus which filters beverage brewed from the brewing apparatus;

**[0028]** A water exporting section which exports beverage filtered from the filtering apparatus;

**[0029]** The filtering apparatus is the filtering apparatus described above.

**[0030]** The filtering apparatus also includes a funnel buckled on the back surface of the base plate, the funnel is sealed

and connected with the base plate, and the water outlet of the funnel is connected with the water exporting section.

[0031] The beverage producing equipment further comprises a transmitting apparatus to make the sealing film of the beverage substance cartridge pierced by the filtering apparatus and make the central axis of the beverage substance cartridge consistent with the central axis of the base plate.

[0032] The included angle between the central axis of the base plate of the filtering apparatus and horizontal is a 60° angle.

[0033] The brewing apparatus has a heating section which heats the water supplied by a water supplying section, a water-filling section which fills the heated water to the beverage substance cartridge and a steeping section which steeps the substance.

[0034] The beverage producing equipment further comprises a controlling section which sends a controlling command to the beverage substance cartridge putting section, the water supplying section, the brewing apparatus, the transmitting apparatus, the filtering apparatus and the water exporting section.

[0035] There is provided a beverage producing system comprising the beverage producing equipment and the beverage substance cartridge described above.

[0036] There is provided a beverage producing method using the beverage producing system described above for beverage production comprising the following steps:

[0037] 1) The beverage substance cartridge is put in the beverage substance cartridge putting section;

[0038] 2) The transmitting apparatus slantwise moves the beverage substance cartridge putting section and pushes towards the filtering apparatus;

[0039] 3) The piercing points on the filtering apparatus pierce the sealing cover of the beverage substance cartridge;

[0040] 4) The water filling section fills water to the beverage substance cartridge and brews the substance in the beverage substance cartridge;

[0041] 5) The filtering apparatus filters brewed beverage out through the filtering screen during brewing;

[0042] 6) The tea water filtered from the filtering holes is transported to the water exporting section through the funnel; and

[0043] 7) The water exporting section is used exports the beverage filtered.

[0044] Due to the technical features above, compared with the present technology, the invention has the following advantages and positive effects:

[0045] The invention provides the beverage substance cartridge, the tea filtering apparatus, the beverage producing equipment, the beverage producing system and the beverage producing method to efficiently filter tea leaf and get rid of the trouble of clearing used tea leaf manually. Wherein the beverage substance cartridge is used in conjunction with the tea filtering apparatus, the piercing point of the triangular pyramid structure could pierce the sealing cover of the beverage substance cartridge and then form matrix-shaped filtering holes in the sealing cover, brewed tea water could flow out, and used tea leaf is left in the extracting cartridge, so the filtering process is simple and convenient without clearing away tea leaf manually.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0046] FIG. 1 is a structural illustration of a beverage producing system in an embodiment of the invention;

[0047] FIG. 2 is a structural illustration of the beverage substance cartridge in the embodiment of the invention;

[0048] FIG. 3 is a longitudinal sectional view of the beverage substance cartridge in the embodiment of the invention;

[0049] FIG. 4 is an AA sectional view of FIG. 2;

[0050] FIG. 5 is a structural illustration of sealing film of the beverage substance cartridge in the embodiment of the invention;

[0051] FIG. 6 is a structural diagram of the beverage producing system in the embodiment of the invention;

[0052] FIG. 7 is a structural illustration of an initial state of a transmitting apparatus in the embodiment of the invention;

[0053] FIG. 8 is a structural illustration of a working state of the transmitting apparatus in the embodiment of the invention;

[0054] FIG. 9 is a front-side structural illustration of a tea filtering apparatus in the embodiment of the invention;

[0055] FIG. 10 is a reverse-side structural illustration of the tea filtering apparatus in the embodiment of the invention;

[0056] FIG. 11 is a front-side vertical view of the tea filtering apparatus in the embodiment of the invention;

[0057] FIG. 12 is a structural illustration of a piercing component of the tea filtering apparatus in the embodiment of the invention;

[0058] FIG. 13 is a structural illustration of a filtering hole in the invention;

[0059] FIG. 14 is a BB sectional view in FIG. 11;

[0060] FIG. 15 is a partial enlargement drawing of Part M in embodiment 1;

[0061] FIG. 16 is a front-side structural illustration of a tea filtering apparatus in modification 1 of embodiment 1;

[0062] FIG. 17 is a reverse-side structural illustration of the tea filtering apparatus in modification 1 of embodiment 1;

[0063] FIG. 18 is a front-side vertical view of the tea filtering apparatus in modification 1 of embodiment 1;

[0064] FIG. 19 is an action flowchart of a beverage producing equipment.

[0065] FIG. 20 is a longitudinal sectional view of the piercing component in modification 2 of embodiment 1;

[0066] FIG. 21 is a CC sectional view in FIG. 20;

[0067] FIG. 22 is a structural illustration of the transmitting apparatus of the beverage producing equipment.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0068] Preferred embodiments of a beverage substance cartridge, a filtering apparatus, a beverage producing equipment, a beverage producing system and a beverage producing method in the invention will be described in detail hereinbelow with reference to the drawings. However, the invention is not only limited to the embodiments. Specific details are given in the following preferred embodiments of the invention to give the public a thorough understanding about the invention.

##### Embodiment 1

[0069] As shown by FIG. 1, the producing equipment system 9 includes the beverage substance cartridge 1 and the beverage producing equipment 2 for use in collaboration.

[0070] The beverage producing equipment 2 has a cavity 23 which corresponds to the beverage substance cartridge 1 in size and shape and is used to put the beverage substance

cartridge 1. The beverage producing equipment 2 has a supporting platform 24, which is a detached horizontal platform to put the cup.

[0071] One set of beverage producing equipment 2 may be used in collaboration with different beverage substance cartridges 1. A user only needs to select a beverage substance cartridge 1, put the cup into the cavity 23 of the beverage producing equipment 2, operate according to prompts on a display screen 21, and then gets brewed beverage in a minute.

[0072] As shown by FIG. 2, the beverage substance cartridge 1 includes a cartridge body 10 and a sealing cover 11.

[0073] The cartridge body 10 is used to accommodate substance 40 for beverage production.

[0074] The sealing cover 11 is used to seal the substance 40 in the cartridge body 10.

[0075] The sealing cover 11 includes at least two layers of sealing film made of different substances. The preferred plan is as follows: the sealing cover is comprised of three layers of sealing film, namely an inner layer of sealing film, a middle layer of sealing film and an outer layer of sealing film from the inside out of the cartridge body in sequence: the inner layer of sealing film is made of polypropylene substance, the same with the substance of the cartridge body, and hot-melt technology is used to seal the cartridge body rapidly after the cartridge body 10 accommodates beverage substance; the middle layer of sealing film is made of aluminum foil substance to make sure the sealing cover has certain strengthen and durability against breakage; and the outer layer of sealing film is made of polyethylene terephthalate substance which makes the sealing cover more aesthetic, and an identification label used to identify beverage is directly printed on an outer layer of sealing film 113. The sealing cover 11 is the sealing film made of at least two layers of different substances, it is multi-layer co-extrusion sealing film with certain flexibility, and after pierced, it will have micro deformation to improve sealing effects.

[0076] The side wall of the cartridge body 10 is integrated of plural arc sections, an internal convex edge is formed where two adjacent arc sections are jointed, and hence the side wall will have many rolling edges. Water will form vortex when water contacts the edge of the cartridge body 10, promote the contact between water and tea leaf, and improve extraction efficiency.

[0077] The cartridge body 10 could be pierced by a needle-shaped piercing point of a water-filling apparatus and also bear pressure formed on the side wall of the cartridge body when vortex is flowing in the cartridge body. Convex or sunk circular rings are at the bottom of the cartridge body 10 to make the cartridge body 10 solidier to bear pressure formed at the bottom of the cartridge body 10 when vortex is flowing in the cartridge body 10.

[0078] In the embodiment, the diameter of the bottom surface of the cartridge body 10 is 38 mm, the diameter of the sealing cover 11 is 50 mm, the inner diameter of the circular ring at the bottom of the cartridge body 10 is 12 mm, and the outer circle's diameter is 20 mm. The circular ring 13 at the bottom of the cartridge body 10 is raised upwards. The distance between two adjacent edges is 5 mm, and the arched convex between two adjacent edges is 1.2 mm thick.

[0079] As shown by FIG. 4, the sealing cover 11 is the sealing film made of at least two layers of different substances which is multi-layer co-extrusion sealing film. In the embodiment, the sealing cover 11 is three-layer sealing film, namely an inner layer of sealing film 111, a middle layer of sealing

film 112 and an outer layer of sealing film 113 from the inside out of the cartridge body in sequence. The inner layer of sealing film 111 is made of polypropylene substance, the same with the substance of the cartridge body, and hot-melt technology is used to seal the cartridge body rapidly after the cartridge body 10 accommodates beverage substance; the middle layer of sealing film 112 is made of aluminum foil substance to make sure the sealing cover has certain strengthen and durability against breakage; and the outer layer of sealing film 113 is made of polyethylene terephthalate substance which makes the sealing cover more aesthetic, and an identification label used to identify beverage is directly printed on the outer layer of sealing film 113. The sealing cover 11 has certain flexibility and undergoes micro deformation to improve sealing effects after pierced.

[0080] As shown by FIG. 5, the beverage producing equipment 2 includes a beverage substance cartridge putting section 31, a transmitting apparatus 66, an inputting and displaying section 38, an identifying apparatus 32, a water supplying section 33, a brewing apparatus 34, a filtering apparatus 6, a water exporting section 35, a controlling section 636 and a beverage substance cartridge collecting section 37.

[0081] The beverage substance cartridge putting section 31 which is used to put the beverage substance cartridge 1 includes the cavity 23 as shown in FIG. 1 which corresponds to the beverage substance cartridge 1 in size and shape.

[0082] The transmitting apparatus 66 (See FIG. 7 and FIG. 8 for details) is put under the beverage substance cartridge putting section 31, and the transmitting apparatus 66 slantways moves or slides the beverage substance cartridge putting section 31.

[0083] The inputting and displaying section 38 is used to display working information of the beverage producing equipment 2 and information of the beverage substance 40 and also to input control commands, and the inputting and displaying section 38 includes the display screen 21 and keyboards 22.

[0084] The display screen 21 displays working status of the beverage producing equipment 2 and also displays relevant knowledge about various beverage substances 40 (such as tea leaf).

[0085] The keyboard 22 is set with corresponding keys to selectively control the work of the beverage producing equipment 2, for example, consulting relevant beverage information or choosing to output commands.

[0086] The identifying apparatus 32 is used to identify the substance 40 in the beverage substance cartridge 1. The identifying apparatus 32 has an obtaining and identifying section 321, a parameter storing section 322 and a retrieving and judging section 323.

[0087] The obtaining and identifying section 321 is used to obtain the identification label in the beverage substance cartridge and identify identification codes corresponding to the identification label 14.

[0088] The pattern identification unit to obtain the identification label 14 is an image pick-up device, such as a camera. The obtaining and identifying section 321 translates the identification label 14 obtained into the identification code readable for the equipment.

[0089] A cache (Not shown in the figure) is set inside of the obtaining and identifying section 321 to save identification code A2 and prepare for comparison of the identification code next.

[0090] The parameter storing section 322 is used to store brewing parameters.

[0091] The retrieving and judging section 323 retrieves the parameter storing section 322 according to the identification label 14 obtained by the obtaining and identifying section 321, and judges the brewing parameter corresponding to the identification label 14.

[0092] The water supplying section 33 is used to supply water for beverage production. The water supplying section 33 includes a water tank and a water pump, the water tank is used to store clear water, and the water pump is used to control the water supplying speed which is generally represented by the break-make ratio of the water pump.

[0093] The brewing apparatus 34 brews the substance 40 according to the brewing parameters judged by the retrieving and judging section 323, and then forms beverage. The brewing apparatus 34 has a heating section 341, a water-filling section 342 and a steeping section 343.

[0094] The heating section 341 is used to heat water supplied by the water supplying section. The heating section 341 has a temperature sensor connected to the controlling section 636. The temperature sensor detects the temperature of the water in the heating section 341 in a real-time way and displays the temperature data in the display screen 21 through the controlling section 636 for users to learn Teatism in the beverage brewing process.

[0095] The water filling section 342 is used to fill heated water into the beverage substance cartridge 1.

[0096] The steeping section 343 is used to steep the substance 40. The substance in the embodiment is tea leaf, and the steeping kinds of tea leaf include three kinds namely tea wakening, presoaking and extracting in sequence.

[0097] The filtering apparatus 6 (See FIG. 9, FIG. 10 and FIG. 11 for details) filters the beverage brewed from the brewing apparatus and includes a base plate 61 with the shape corresponding to the beverage substance cartridge 1, and plural piercing components 62 are evenly set on the front side of the base plate 61. Piercing components 62 pierce the sealing cover 11 of the beverage substance cartridge 1, and the piercing component 62 includes a piercing base 63 set on the base plate and the piercing point 64 integrated with the piercing base 63 (See FIG. 12 for details). Plural filtering holes 65 are set on the base plate 61 and the piercing point 64 is a polygonal pyramid structure.

[0098] As shown by FIG. 7 and FIG. 8, the beverage substance cartridge putting section 31 is fixed on the transmitting apparatus 66. The position of the beverage substance cartridge putting section 31 is at the top of the beverage producing equipment 2 under the initial state, and a covering plate which could be uncovered is right above the beverage substance cartridge putting section 31 for users to put the beverage substance cartridge 1; the beverage substance cartridge 1 is closely adjacent to the filtering apparatus 6, and pierced by the piercing point 64 of the filtering apparatus 6, and moreover, the central axis of the beverage substance cartridge 1 is consistent with that of the base plate 6. The transmitting apparatus 66 slantways moves or slides the beverage substance cartridge putting section 31, so the beverage substance cartridge putting section 31 is shifted between two positions.

[0099] The filtering apparatus 6 and the transmitting apparatus 66 are mounted on a rack 68 inside of the beverage producing equipment 2, the filtering apparatus 6 is set on the top of the rack 68, and the base plate 61 of the filtering apparatus 6 has a certain included angle with the level surface,

which is generally a 0-60° angle. A 30° angle is selected in the embodiment, and the central axis of the base plate 61 of the filtering apparatus 6 has a 30° included angle with the level surface. The transmitting apparatus 66 is set under the filtering apparatus 6, the upward moving route of the beverage substance cartridge putting section 31 in the rack 68 has a 30° included angle with the level surface, and the angle P shown in FIG. 7 and FIG. 8 is 30°.

[0100] As shown by FIG. 9, FIG. 10 and FIG. 11, the piercing point 64 is a polygonal pyramid, the piercing base 63 is a polygonal prism, multi-edge cylinder or column, the filtering hole 65 is set between two adjacent edges on the base plate 61. In the embodiment, the piercing point 64 is a triangular pyramid, the piercing base 63 is a triangular prism, and three filtering holes 65 run through the base plate. In the embodiment, the filtering hole 65 is set between two adjacent edges of the base plate 61, three filtering holes 65 are near every piercing component 62, and these three filtering holes 65 and the piercing component 62 constitute into a filtering hole group 67. In the invention, possibly 24-60 filtering hole groups 67 are set on the base plate 61 (See FIG. 11 and FIG. 13 for details). 48 groups are preferred in the embodiment. The sealing cover 11 and the filtering hole 65 form a filtering screen to filter tea leaf. The diameter of the filtering hole 65 is small enough to keep tea leaf powder into the beverage substance cartridge 1.

[0101] In the embodiment, the sealing cover 11 and the filtering hole 65 form a filtering screen, the unit time tea producing amount of the beverage producing equipment 2, i.e. the unit time tea water filtering amount of the filtering apparatus 6, is in proportion to the number of filtering holes 65, and in proportion to the diameter of the filtering hole 65 or the cross section area of the filtering hole 65, and in inverse proportion to the volume of the beverage substance cartridge 1. The unit time tea water producing amount of the beverage producing equipment 2 corresponds to the volume of the beverage substance cartridge 1, the number of the filtering holes 65, the diameter of the filtering hole 65 or the cross section area of the filtering hole 65 respectively.

[0102] As shown by FIG. 12, the piercing point 64 has diverse shapes, only the keen-edge piercing part is necessary, the cross section area of the piercing base 63 corresponding to the piercing point should be equal to or larger than the cross section of the piercing point 64, the filtering hole 65 has certain depth to penetrate the base plate 61, or penetrate the base plate 61 and the piercing base 63, and even penetrate the base plate 61, the piercing base 63 and the piercing point 64 at the same time.

[0103] Before use, the filtering apparatus 6 has a fixing hole in the centre which inversely mounts the filtering apparatus 6 in the beverage producing equipment 2 through the fixing hole, and the piercing point 64 is downward after mounting.

[0104] The beverage producing equipment 2 also includes the transmitting apparatus 66 which makes the sealing cover 11 of the beverage substance cartridge 1 pierced by the filtering apparatus 6 and the central axis of the beverage substance cartridge 1 consistent with the central axis of the base plate 61. The transmitting apparatus 66 is a pure mechanical apparatus to push the beverage substance cartridge putting section 31 to slantways move and slide, make the beverage substance cartridge 1 collide into the piercing point 64 of the filtering apparatus 6, the piercing point 64 pierces the sealing cover of the beverage substance cartridge 1, and at least one filtering hole 65 is set near every piercing component 62.

[0105] In the embodiment, the front side of the base plate 61 is convex cambered surface, the included angle between the base plate 61 of the filtering apparatus 6 and the level surface is a 60° angle to make sure the piercing point 64 of the filtering apparatus 6 could pierce the sealing cover of the beverage substance cartridge rapidly and correctly into many small holes. After piercing the sealing cover 11 of the beverage substance cartridge, the piercing point 64 keeps the piercing state, and the filtering holes 65 of the piercing point 64 form a filtering screen. The sealing cover 11 has certain flexibility, and undergoes micro deformation after pierced to improve the sealing effects near the piercing point 64.

[0106] As shown by FIG. 22, the filtering apparatus 6 also includes a funnel 71 buckled on the reverse side of the base plate 61, the funnel 71 is sealed and connected with the base plate 61 to prevent leakage of tea leaf. The water outlet of the funnel 71 is connected with water exporting section 35, and the funnel 71 is used to gather filtered tea water and transport to the water exporting section 35.

[0107] In the embodiment, the substance of the filtering apparatus 6 is aluminum or polypropylene plastic. Aluminum or polypropylene plastic is adopted to realize low costs, comparatively light weight, good abrasion resistance and a long service life.

[0108] As shown by FIG. 14 and FIG. 15, the angle Q in FIG. 15, i.e. the included angle on the top of the piercing point 64, is ranged from 30° to 60°. The preferred plan is a 51.2° angle in the embodiment.

[0109] The controlling part of the beverage producing system controls hot water filled into the beverage substance cartridge 1, after hot water reaches certain amount, hot water will be filled in continuously to push the tea water in the beverage substance cartridge 1 from the crack between the tea filtering apparatus 6 and the sealing film of the beverage substance cartridge 1 and flow into the tea exporting outlet of the apparatus, and tea water flows into the reverse side of the tea filtering apparatus from the front side. Tea water flows into a tea exporting pipe through the gap formed by isolated blocks from the reverse side of the tea filtering apparatus 6, and the tea water is exported from the beverage producing system and flows into the tea cup of users.

[0110] The water exporting section 35 exports the brewed beverage. The water exporting section 35 includes a supporting platform 24 and a water outlet (Not shown in the figure), the water outlet is set right above the supporting platform 24, and the produced beverage flows out from the water outlet. The supporting platform 24 is a hollow structure inside, some small, thin and long holes are on the surface of the supporting platform, and the water overflowing from cups will flow into the cavity of the supporting platform 24 for clearing.

[0111] The controlling section 636 is used to send control commands to the water supplying section 33, the brewing apparatus 34 and the water exporting section 35. The controlling section 636 and the inputting and displaying section 38 have combined action to control displayed content and operation options of the beverage producing equipment 2.

[0112] The beverage substance cartridge collecting section 37 is used to collect used beverage substance cartridges 1. The beverage substance cartridge collecting section 37 includes a used cup bucket. The supporting platform 24 is pushed in and pulled out and the rear part is connected with a square used cup bucket. After the brewing process is finished, the mechanical apparatus in the beverage producing equipment inverts the beverage substance cartridge putting section, and

discards used beverage substance cartridges to the used cup bucket for collection. After the supporting platform 24 is pulled out, more than one used beverage substance cartridges are dumped at a time.

[0113] As shown by FIG. 16, the action flow for the beverage producing system to produce beverage in the embodiment includes the following steps:

[0114] To put the beverage substance cartridge 1 in the beverage substance cartridge putting section 31, and cover up the cover (Step 101).

[0115] Commands are input by using the keyboard 22 in the inputting and displaying section 38, the controlling section sends commands to the water supplying section 33, the brewing apparatus 34 and the transmitting apparatus 66, and the transmitting apparatus 66 slantways moves the beverage substance cartridge putting section 31 and pushes towards the filtering apparatus 6 (Step 102).

[0116] The piercing point 64 on the filtering apparatus 6 pierces the sealing cover 11 of the beverage substance cartridge 1 to make the piercing point embedded in the sealing cover (Step 103).

[0117] The piercing point 64 and the sealing cover 11 have good sealing performance, and the filtering hole in the piercing point 64 and the sealing cover 11 of the beverage substance cartridge 1 form a filtering screen in conjunction to filter tea leaves (Step 104).

[0118] The piercing point of the water filling section 342 in the brewing apparatus 34 pierces the bottom of the beverage substance cartridge 1, so the piercing point is embedded in the bottom surface of the cartridge body 10, and the shortest distance between the piercing point and the rim of the cartridge body 10 is 4 mm (Step 105).

[0119] The water supplying section 33 is used to supply water, and the heating section 341 in the brewing apparatus 34 heats the water supplied by the water supplying section 33 (Step 106).

[0120] The water filling nozzle under the piercing point of the water filling section 342 fills hot water into the beverage substance cartridge 1 for brewing (Step 107).

[0121] The filtering apparatus 6 filters brewed beverage through the filtering screen during brewing (Step 108).

[0122] The tea water filtered is transported to the water exporting section 35 through the funnel 71 (Step 109).

[0123] The water exporting section 35 is used to export filtered beverage (Step 110).

[0124] After the brewing process is finished, the controlling section 636 sends a command, and the beverage substance cartridge collecting section 37 receives the command and then collects beverage substance cartridges (Step 111).

[0125] The invention filters tea leaves efficiently without the trouble of clearing away tea leaves manually. Wherein the beverage substance cartridge is used collaboratively with the tea filtering apparatus, the piercing point of the triangular pyramid pierces the sealing cover of the beverage substance cartridge and then forms matrix-shaped filtering holes in the sealing cover, brewed tea water flows out, and used tea leaves are kept in the extracting cartridge, so the filtering process is simple and convenient.

#### Modification 1

[0126] As shown by FIG. 17, FIG. 18 and FIG. 19, a piercing point 641 could be a triangular pyramid likewise, a corresponding piercing base 631 is a cylinder, and more than one filtering holes run through the piercing base and base plate. In

the embodiment, the piercing point **641** is a triangular pyramid, a corresponding piercing base **631** is a cylinder, and three filtering holes **651** penetrate the cylinder piercing base and a base plate **611**. Plural isolating blocks **691** arranged in a circular ring are set on the reverse side of the base plate **611**, the filtering apparatus also includes a filtering screen, the filtering screen is used in conjunction with the base plate **611**, and isolating blocks isolate the filtering screen and the base plate **611** so the two complete filtering for two times and the beverage filtering effects are better.

#### Modification 2

**[0127]** As shown by FIG. 20 and FIG. 21, a piercing point **642** is also a cylinder, the corresponding piercing base **632** is a cylinder, and four filtering holes **652** penetrate a piercing point **642**, the piercing base **632** and a base plate **612**. The external shape of the piercing component is different from modification 1, but the filtering effects are better.

**[0128]** Besides, a piercing point **642** is a polygonal pyramid, the corresponding piercing base **632** is a cylinder, and three filtering holes **652** penetrate the cylinder piercing base and the base plate **612**. The external shape of the piercing component is different from embodiment 1, but the filtering effects are similar to embodiment 1.

**[0129]** Besides, the piercing point **64** could be also a polygonal pyramid, the corresponding piercing base **63** is a multi-edged prism, and plural filtering holes **65** penetrate the piercing base and the base plate. The external shape of the piercing component is different from embodiment 1, but the filtering effects are similar to embodiment 1.

**[0130]** The piercing point **64** could be also a polygonal pyramid, the corresponding piercing base **63** is a multi-edged prism or cylinder, and plural filtering holes **65** penetrate the piercing point, the piercing base and the base plate. The external shape of the piercing component is different from embodiment 1, but the filtering effects are similar to embodiment 1.

**[0131]** The shapes of the piercing point **64** and the piercing base **63** are different, but they both ensure the piercing point **64** pierces the sealing cover **11** of the beverage substance cartridge **1**, and keep good tightness.

**[0132]** The substance in the cartridge body is any one of or at least two of tea leaf, dried vegetable, dried fruit and Chinese medicinal herb. The beverage producing system of the invention could produce tea drinks, fruit and vegetable drinks, Chinese medicinal herb health care drinks, etc., and some tea could be brewed for more than one time.

**[0133]** To sum up, the invention has the following advantages and positive effects:

**[0134]** The invention provides the beverage substance cartridge, the tea filtering apparatus, the beverage producing equipment, the beverage producing system and the beverage producing method to efficiently filter tea leaf and get rid of the trouble of clearing used tea leaves manually. Wherein the beverage substance cartridge is used in conjunction with the tea filtering apparatus, the piercing point of the triangular pyramid structure could pierce the sealing cover of the beverage substance cartridge and then form matrix-shaped filtering holes in the sealing cover, brewed tea water could flow out, and used tea leaf is left in the extracting cartridge, so the filtering process is simple and convenient without clearing away tea leaves manually.

1. A beverage substance cartridge, comprising: a cartridge body which accommodates substance for beverage production and a sealing cover to seal said substance in said cartridge body, wherein said sealing cover includes at least two layers of sealing film made of different substances.
2. The beverage substance cartridge according to claim 1, wherein said sealing cover consists three layers of said sealing film, said three layers of sealing film are an inner layer of sealing film, a middle layer of sealing film and an outer layer of sealing film, which are in sequence from inside of said cartridge body to outside of said cartridge body.
3. The beverage substance cartridge according to claim 2, wherein said inner layer of sealing film is made of propene polymer material, said middle layer of sealing film is made of aluminum foil material, and said outer layer of sealing film is made of polyethylene terephthalate material.
4. The beverage substance cartridge according to claim 1, wherein said substance is any one of or a combination of at least two of tea leaf, dried vegetable, dried fruit and Chinese medicinal herb.
5. A filtering apparatus which provides a filtering function for said beverage substance cartridge according to claim 1, comprising:
  - a base plate which corresponds to the shape of said beverage substance cartridge, wherein on front surface of said base plate, plural piercing components are evenly set which could pierce said sealing cover of said beverage substance cartridge, said piercing component includes a piercing base which is set on said base plate and a piercing point which is forming integrated with said piercing base, said base plate is set with plural filtering holes.
  6. The filtering apparatus according to claim 5, wherein said front surface is a convex arc surface.
  7. The filtering apparatus according to claim 5, wherein said piercing point is a multi-edge pyramid, said piercing base is a multi-edge cylinder, said plural filtering holes run through piercing points, said piercing base and said base plate.
  8. The filtering apparatus according to claim 5, wherein said piercing point is a multi-edge pyramid, said piercing base is a cylinder, and said plural filtering holes run through said piercing points, said piercing base and said base plate.
  9. The filtering apparatus according to claim 5, wherein said piercing point is a cone, said piercing base is a cylinder, and said plural filtering holes run through said piercing points, said piercing base and said base plate.
  10. The filtering apparatus according to claim 5, wherein said piercing point is a polygonal pyramid, said piercing base is a polygonal cylinder, and said plural filtering holes run through said base plate.
  11. The filtering apparatus according to claim 5, wherein said piercing point is a polygonal pyramid, said piercing base is a cylinder, and said plural filtering holes run through said piercing base and said base plate.

- 12. The filtering apparatus according to claim 5, wherein said piercing point is a polygonal pyramid, said piercing base is a multi-edge cylinder, and said plural filtering holes run through said piercing base and said base plate.
- 13. The filtering apparatus according to claim 12, wherein said piercing point is of triangular pyramid structure, said piercing base is a triangular prismoid, said filtering hole is set between two adjacent edges on said base plate, and three said plural filtering holes are set at the root of every said piercing point.
- 14. The filtering apparatus according to claim 5, wherein the material of said filtering apparatus is aluminum or propene polymer plastic.
- 15. A beverage producing equipment which uses said beverage substance cartridge described in claim 1, for beverage production, comprising:
  - a beverage substance cartridge putting section which put said beverage substance cartridge;
  - a water supplying section which supply water for beverage production;
  - a brewing apparatus which brews said substance into beverage;
  - a filtering apparatus which filters beverage brewed from said brewing apparatus; and
  - a water exporting section which exports beverage filtered from said filtering apparatus.
- 16. The beverage producing equipment according to claim 15, wherein said filtering apparatus also includes a funnel buckled on the back surface of said base plate, said funnel is sealed and connected with said base plate, and the water outlet of said funnel is connected with said water exporting section.
- 17. The beverage producing equipment according to claim 15, further comprising:
  - a driving apparatus to make said sealing film of said beverage substance cartridge pierced by said filtering apparatus and make the central axis of said beverage substance cartridge consistent with the central axis of said base plate.
- 18. The beverage producing equipment according to claim 17, wherein the included angle between said central axis of said base plate of said filtering apparatus and horizontal is a 60° angle.

- 19. The beverage producing equipment according to claim 15, wherein said brewing apparatus has a heating section which heats the water supplied by said water supplying section, a water filling section which fills the heated water to said beverage substance cartridge and a steeping section which steeps said substance.
- 20. The beverage producing equipment according to claim 15, further comprising:
  - a controlling section which sends a controlling command to said beverage substance cartridge putting section, said water supplying section, said brewing apparatus, said driving apparatus, said filtering apparatus and said water exporting section.
- 21. A beverage producing system, comprising:
  - said beverage producing equipment described in claim 20, and
  - said beverage substance cartridge described in claim 1.
- 22. A beverage producing method which uses said beverage producing system described in claim 21 for beverage production, comprising:
  - the following steps:
    - 1) putting said beverage substance cartridge in said beverage substance cartridge putting section;
    - 2) said driving apparatus slantwise moves said beverage substance cartridge putting section and pushes towards said filtering apparatus;
    - 3) said driving apparatus pushes said beverage substance cartridge putting section to said filtering apparatus;
    - 4) said piercing points on said filtering apparatus pierce said sealing cover said beverage substance cartridge, and said piercing points are embedded in said sealing cover;
    - 5) said piercing points and said sealing cover have good sealing performance, and plural filtering holes in said piercing points and said sealing cover form a filtering screen in conjunction to filter substance;
    - 6) said water filling section fills water to said beverage substance cartridge and brews said substance in said beverage substance cartridge;
    - 7) said filtering apparatus filters brewed beverage out through said filtering screen during brewing;
    - 8) said beverage filtered from said filtering screen is transported to said water exporting section through said funnel; and
    - 9) said water exporting section exports said beverage filtered.

\* \* \* \* \*