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(54) **CAPSULE FOR BEVERAGES AND BEVERAGE PREPARATION METHOD**

(57) The object of the invention is a capsule for beverages and the method of beverage preparation from substances placed in the upper part of the capsule that are subjected to the processes of extracting, dissolving and diluting by injecting liquid under pressure into the capsule in an appliance for preparing beverages, where the capsule comprises a casing closed with barriers which can be punctured at the top and the base, designed for the preparation of hot, cold or chilled beverages, liquid food and liquid additives to food, especially such drinks as cappuccino, coffee, chocolate, Latte Machiatto, Ice Frappe, soups, teas, juices, desserts, sauces/dressings,

alcoholic drinks and beer.

The capsule is characterised in that inside a casing (1), at the level of the upper part (39) of the casing (1), between an upper barrier (2) and the surface (37) of a separator (4) connected tightly along its perimeter (6) to the inner surface (7) of the casing (1), there is a bush (35) fitted at the base with openings (36) for the outflow of the liquid to mix the substances in the direction from the separator (4) towards the upper barrier (2), and the outflow from each hole (12) in the separator (4) is controlled by a pressure control valve (43).

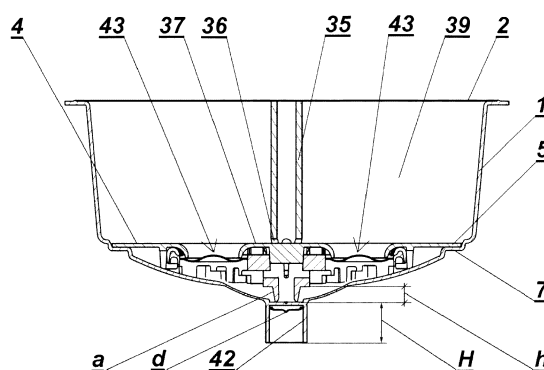


Fig. 3

Description

[0001] The object of the invention is a capsule for beverages and the method of beverage preparation from substances placed in the upper part of the capsule that are subjected to the processes of extracting; dissolving and diluting by injecting into them liquid under pressure in an appliance for preparing beverages, where the capsule comprises a casing closed with puncturable barriers at the top and the base and it is designed for the preparation of hot, cold or chilled beverages, liquid food and liquid additives to food, especially such drinks as cappuccino, coffee, chocolate, Latte Machiatto, Ice Frappe, soups, teas, juices, desserts, sauces/dressings, alcoholic drinks and beer.

[0002] There is an appliance for extracting a food substance contained in a sealed cartridge and the method of extracting a food substance contained in a sealed cartridge known from the Polish Patent No. 196425. The appliance has a hollow body with a chamber for inserting the cartridge, a water feeding duct running through the body and connected to the chamber and many puncturing elements distributed across the chamber. The puncturing elements puncture the cartridge in many separate places enabling water to flow into the cartridge and these are spaced across the chamber along the direction of water inflow. Furthermore, each puncturing element comprises a basic component that is connected to the body and protrudes into the chamber, and this basic component enters the cartridge at least partially forming in it the surface of water inflow inside the cartridge, and the basic component is a solid part with a closed cross-section while each puncturing element has a cutting face that cuts the basic component at an acute angle. The cross-section of the basic component narrows down gradually towards the cutting face at the " β " angle smaller than the " α " angle of the cutting face.

[0003] There is a replaceable cartridge known from the Polish Patent No. 171494 for a beverage brewing appliance that has a rigid, cylindrical casing which is hollow inside for placing beverage powder, with a non-perforated side wall and perforated central part that constitutes the casing inlet and the opposite perforated base that constitutes the casing outlet. There is an outer plastic ring-shaped protrusion around the central part that touches an external heat source in the form of the heated plate of the beverage brewing appliance. The outer plastic circumferential protrusion is subject to plastic deformation by the action of the external heat source and its front wall is formed in such a manner that it is part of the side surface of a truncated cone with an obtuse vertical angle, with its vertex located in the axis of the casing, and the temperature of protrusion softening is lower than the boiling point of water while the temperature of its melting is higher than the boiling point of water.

[0004] There is a container known from the Polish Patent Application No. P-385854 submitted according to the publication WO 2007/054479 A1 of the Application

PCT/EP2006/068121 that has several chambers and contains at least one beverage ingredient for beverage preparation, used to prepare a beverage by mixing it with liquid input to the container, and the container inside is divided into at least two separate chambers.

This container may be in the form of a capsule or bag containing at least one ingredient for preparing a beverage, and such a beverage is prepared by mixing liquid input to the capsule, while the capsule inside is divided into at least two separate chambers, the first and the second one, and each chamber contains a beverage ingredient or beverage ingredient mix, while the first chamber is adapted to release the ingredient or ingredient mix at a time lag versus the second chamber when the liquid is input inside the capsule to make the beverage.

[0005] There is a capsule that is subjected to extraction and the method of improving hygiene and reducing contamination when preparing a beverage from the capsule known from the Polish Patent Description No. 201325.

The capsule according to that invention is subjected to extraction by injecting liquid under pressure into the capsule in an appliance for preparing a beverage, and the capsule contains a substance for preparing the beverage in a sealed chamber and a means of opening the capsule applied, where the opening of the capsule permits the beverage to flow out as a result of the interaction of the opening means and the chamber wall under the influence of the liquid pressure increase in the chamber.

[0006] There is a capsule for beverages known from the Polish Patent Description No. 219698 subjected to extracting, dissolving and diluting its content by injecting liquid under pressure into the capsule in an appliance for preparing beverages, comprising a casing containing such a substance closed with puncturable membranes at the top and the base, which is characterised in that there are at least two internal concentric chambers inside the casing sealed with the membrane at the top, fitted with a cap with a ring turned inside fitted with reinforcements spaced along its internal side, while at the base the cap has a ring turned outside fitted with passages that adhere to a spacing insert, and there is a frothing insert placed inside the area surrounded by the ring and fitted at the top with slots spaced around the ring perimeter and spacing mandrels and fitted at the base with concentric segmented rings of variable thickness and with a preferably centrally placed punch partly located in the outflow duct hole covered with the outflow membrane, where part of the casing base is rounded outwards within the outflow duct. The spacing insert has concentric rings on the inside, where there are indentations on the perimeter of the inner ring and passages on the rim of the outer ring, and there is a passage in the base of the spacing insert, while the rim of the spacing insert is clasp locked along its whole perimeter with a flange inside the casing. The frothing insert has a flexible sealing lip turned out along its perimeter.

[0007] There is a capsule for beverages known from the Polish Patent Description No. 220172 subjected to

the processes of extracting, dissolving and diluting its content by injecting liquid under pressure into the capsule in an appliance for preparing beverages, comprising a casing containing such a substance closed with puncturable membranes at the top and the base, which is characterized in that there is one internal chamber inside the casing which has a spacing insert in its lower part, and there is a frothing insert placed inside the area surrounded by the ring and fitted at the top with slots spaced around the ring perimeter and a row of spacing mandrels and fitted at the base with a row of concentric segmented rings of variable thickness and with a preferably centrally placed punch partly located in the outflow duct hole covered with the outflow membrane, where part of the casing base is rounded outwards within the outflow duct. The spacing insert is fitted with a passage and has concentric rings on the inside, where there is a row of indentations on the perimeter of the inner ring and the rim of the insert is clasp locked along its whole perimeter with a flange inside the casing. In the locking area with the rim, the flange has the shape of a reversed letter "J". The frothing insert has a flexible sealing lip turned out along its perimeter.

[0008] The biggest disadvantages of the capsules currently used for beverages is the incomplete mixing of the ingredients and the residue of mixed ingredients on the surfaces of capsule components after the capsule has been emptied as well as the difficulty in recycling due to the material used for the top and base membranes, which are made of various types of foils, most often aluminium foil, which means that these foils must be manually removed in order to recycle the capsule.

[0009] The purpose of the invention is to design a capsule for beverages made completely of a homogeneous material and the method of beverage preparation from the substances contained in that capsule, and the said capsule enables the content to be mixed and contained in the upper part of the casing and the complete mixing of the substance which is then discharged from the appliance for beverage preparation in a laminar manner.

[0010] The capsule for beverages that comprises the casing sealed tightly with the upper barrier at the top and the lower barrier at the base, where there is a separator located in the casing with at least one hole and connected to the casing along its perimeter, and in the upper part of the capsule casing between the upper barrier and the separator, there is a substance subjected to the processes of extracting, dissolving and diluting its content by injecting liquid under pressure into it within the appliance for preparing beverages, and that contains a mixing unit located between the separator and the lower barrier which seals the outflow duct through which the prepared content flows out, according to the invention is characterised in that the separator is tightly connected along its perimeter to the inner surface of the casing, and the outflow from each hole in the separator is controlled by a pressure control valve. There is a bush between the separator and the upper barrier fitted with the holes at the

base allowing the liquid to flow out for the purpose of mixing the substance in the direction from the separator to the upper barrier. The bush may or may not be detachable from the separator. Inside the separator area determined by a ring fastened to the separator from below, there is mixing unit guide seated in a recess made in the mixing unit, whose arms have outflow holes at the ends placed in the walls of the recess, and connected to the central hole of the punch that punctures the barrier which has at least one notch in the centre of the casing, and is part of the casing where the punch, in its working position, after puncturing the lower barrier, seals the resulting hole with its outer surface during the outflow of the prepared mix, and the generating line of the punch is longer than half the length cut on the inside of the barrier, and the height of the punch is shorter than the height of the casing outflow duct. The method of beverage preparation from a substance contained in a hermetically sealed capsule in an appliance for preparing beverages, where the said capsule has inside its casing a separator separating the upper part of the capsule interior between that separator and the upper barrier of the casing, where the said substance is contained in the upper part and below the separator there is a mixing unit and an outflow duct sealed by the lower barrier, and the method comprises inserting the capsule in the appliance for preparing beverages and opening it from the base, and then puncturing the upper barrier and injecting liquid under pressure, according to the invention is characterised by that the liquid under pressure is injected by at least one pressure nozzle into the central hole of the bush which is typically free of the substance used for beverage preparation, and in the lower part of the side wall of the bush there is at least one opening located in the immediate vicinity of the capsule separator surface, through which the liquid under pressure is fed continuously from the base towards the upper part of the casing containing the said substance for the purpose of its preliminary dilution until at least one pressure control valve, through which the diluted substance flows into the mixing unit, opens and, when it is finally mixed, the substance is discharged from the capsule through the central hole in the mixing unit punch located in the outflow duct.

[0011] The method of beverage preparation from a substance contained in a hermetically sealed capsule in an appliance for preparing beverages, where the said capsule has inside its casing a separator separating the upper part of the capsule interior situated between that separator and the upper barrier of the casing, where the said substance is contained in the upper part and below the separator there is a mixing unit and an outflow duct closed by the lower barrier, and the method comprises inserting the capsule in the appliance and opening it from the base, and then puncturing the upper barrier and injecting liquid under pressure, according to the invention is characterised by that the liquid under pressure is injected through at least one pressure nozzle into the upper part of the casing containing the said substance for the

purpose of its preliminary dilution until at least one pressure control valve, through which the diluted substance flows into the mixing unit, opens and, when it is finally mixed, the substance is discharged from the capsule through the central hole in the mixing unit punch located in the outflow duct.

[0012] The advantage of the capsule according to the invention is that owing to the application of the tight connection between the separator and the inner rim and of the pressure control valves, especially the diaphragm pressure control valves, the complete tightness of the capsule in its upper area has been achieved, which is especially significant when storing thickened juices or other concentrated liquids, and by the application in the capsule option of a bush fitted with holes at the base, a uniform mixing of ingredients is achieved followed by the evacuation of the total contents of the capsule through the punched-through lower barrier which is made of a homogeneous material that eliminates the need for aluminium foils, which are currently used, and discharges the content outside in a laminar manner without splashing it on the inner walls of the outflow duct. In case of this capsule, complete recycling of the whole capsule is possible, since it is made completely of a homogeneous material.

[0013] The object of the invention has been shown in a sample embodiment in the drawing, where Fig. 1 - shows a side view of the capsule, Fig. 2 - shows an axial section of the capsule, Fig. 3 - shows an axial section of the capsule fitted with the bush, Fig. 4 - shows a base view of the separator, Fig. 5 - shows a top view of the separator, Fig. 6 - shows a top view of the separator for connecting the bush, Fig. 7 - shows an axial section of the separator, Fig. 8 - shows a top view of the separator fitted with the bush, Fig. 9 - shows an axial section of the separator fitted with the bush, Fig. 10 - shows an axial section of the bush, Fig. 11 - shows a view of the bush from the side of the outflow holes, Fig. 12 - shows an axial section of the mixing unit, Fig. 13 - shows a base view of the mixing unit, Fig. 14 - shows a top view of the mixing unit, Fig. 15 - shows a top view of the middle of the capsule without the separator and the mixing unit, Fig. 16 - shows an axial section of the capsule placed in the tray of the appliance for preparing beverages before emptying it, Fig. 17 - shows an axial section of the capsule placed in the tray of the appliance for preparing beverages during emptying it, Fig. 18 - shows an axial section of the capsule fitted with the bush and placed in the tray of the appliance for preparing beverages before emptying it, Fig. 19 - shows an axial section of the capsule fitted with the bush and placed in the tray of the appliance for preparing beverages when the liquid is being injected into the central hole in the bush, and Fig. 20 - shows an axial section of the capsule fitted with the bush and placed in the tray of the appliance for preparing beverages during the process of extracting and emptying it.

[0014] As shown in the drawing, the capsule for beverages has the casing 1, made of a homogeneous ma-

terial, as are all capsule components, which is sealed with the upper barrier 2 at the top and with the lower barrier 3 at the base, which act as tight closures of the separated capsule zones (Fig. 2). There is the separator 4 inside the casing 1 fitted with the rim 5, which is connected tightly by welds to the ring-shaped surface 7 of the part of the casing 1 (Fig. 3). The separator 4 connected to the bush 35 and which may not be detached has at least one funnel-shaped passage 12 inside the area 8 surrounded by the centric ring 9 consisting of segments 10 with the gaps 11 between them, and the guide 13 placed in the geometric centre of the area 8, which is inserted in the cruciform hole 14 - which can have other geometric shapes - of the mixing unit 15, thus the rotation of the mixing unit 15 inside the casing 1 is prevented (Fig. 3 - 4, Fig. 12, Fig. 14). The bush 35 has the central hole 28 for injecting liquid under pressure during capsule extraction, and the said central hole 28 is generally free of the substances contained in the upper part 39 of the capsule, which means that the substance is not placed in the central hole but can enter it as a result of the migration from the upper part 39 of the capsule through the openings 36 in the bush 35 walls, and the said bush 35 supports the upper barrier 2, which is significant for the process of pasteurization of the content in the upper part 39 (Fig. 2, Fig. 3, Fig. 10).

[0015] The option of the separator 4 connected to the bush 35, and which may be detached, is also fitted with the passage openings 36 located near the surface 37. The application of the openings 36 improves the quality of mixing or diluting the concentrated liquids in the capsule (Fig. 3, Fig. 10).

[0016] In the area between the separator 4 and the mixing unit 15, there is at least one pressure control valve 43 in the form of the diaphragm 44 closing the hole 12, located in the separator 4 above the diaphragm 44 placed in the mixing unit 15. The pressure control valve 43 opens when the pressure set in the upper part 39 of the casing 1 for extracting, dissolving and diluting processes is exceeded (Fig. 3 - 4, Fig. 12).

[0017] The cruciform hole 14 is made on the side of surface 16 fitted with a row of spacing protrusions 17 and the ring 29 comprising the protrusions 18 and the indentations 19 between them and it has arms 20 with outflow holes 21 at the ends placed in the walls 40 of the punch 23 base 46, while the concentric rings 25 made of shaped segments 26 and holes 27 are seated on the side of the base 24 and connected to it and cannot be detached. (Fig. 12- 14).

[0018] The outflow holes 21 are connected with the central hole 22 of the punch 23 that punctures the barrier 3 along at least one notch 45, which on splitting into parts additionally seals the outflow duct 41 in its upper part with the outer surface of the punch 23 base 46, thus forcing the outflow of the prepared mix through the central hole 22 and preventing the uncontrolled outflow of the prepared mix along the inner surface 42 of the outflow duct 41 (Fig. 3, Fig. 12, Fig. 15). The generating line a

of the punch 23 is longer than half the length d cut on the inside of the barrier 3, and the height h of the punch is shorter than the height H, of the casing 1 outflow duct 41 (Fig. 2 - 3, Fig. 12, Fig. 15).

[0019] To empty the capsule of beverage ingredients it is placed in the removable tray 31, which is then locked inside the appliance 32 for prepare hot or cold beverages and as the tray 31 is raised the capsule is additionally sealed around its entire perimeter and thus, the rounding 33 moves towards the punch 23 which punches through the barrier 3 along at least one notch 45, and on splitting into parts it additionally seals the outflow duct 41 in its upper part with the outer surface of the punch 23 base 46, thus forcing the outflow of the prepared mix through the central hole 22 and preventing the uncontrolled outflow of the prepared mix along the inner surface 42 of the outflow duct 41 (Fig. 12, Fig. 15-17). At the same time, the barrier 2 is also punched through by the nozzle 34 and after cold or hot water is fed under pressure into the capsule through the hole 38 the content in the upper part 39 of the capsule is dissolved/diluted and the prepared mixed content flows out through the holes 12, outflow holes 21, mixing unit labyrinth 15, central hole 22 and the outflow duct 41 outside to a receiving vessel, namely a cup, a glass or another container (Fig. 12, Fig. 17, Fig. 18 - 19).

Example I. The method of beverage preparation from a substance contained in the hermetically-sealed capsule 1 in the appliance 32 for preparing beverages consists in injecting water under pressure through at least one pressure nozzle 34 into the central hole of the bush 35 generally free of the substance used for beverage preparation, and the said bush 35 in the lower part of its side wall is fitted with the opening 36 located in the immediate vicinity of the capsule 1 separator 4 surface 37, through which the liquid under pressure is fed from the base to the upper part 39 of the casing 1 for the purpose of diluting it until the pressure control valve 43 through which the diluted substance flows into the mixing unit 15 opens and, upon its final mixing, is discharged from the capsule 1 through the central hole 22 in the mixing unit 15 punch 23 located in the outflow duct 41 (Fig. 3, Fig 16 - 20).

Example II. The method of beverage preparation from a substance contained in the hermetically-sealed capsule 1 in the appliance 32 for preparing beverages consists in injecting water under pressure through at least one pressure nozzle 34 into the upper part 39 of the casing 1 for the purpose of its preliminary dilution until the pressure control valve 43 through which the diluted substance flows into the mixing unit 15 opens and, when the beverage is finally mixed it is discharged from the capsule 1 through the central hole 22 in the mixing unit 15 punch 23 located in the outflow duct 41. (Fig. 3, Fig. 16 - 17).

Claims

1. The capsule for beverages that comprises a casing

(1) sealed tightly with an upper barrier (2) at the top and a lower barrier (3) at the base, with a separator (4) located in the casing (1) with at least one hole (12) and this separator connected to the casing (1) along its perimeter, and in the upper part (39) of the capsule casing (1) between the upper barrier (2) and the separator (4), there is a substance subjected to the processes of extracting, dissolving and diluting its content by injecting liquid under pressure into it within the appliance for preparing beverages, and that contains a mixing unit (15) located between the separator (4) and the lower barrier (3) which seals an outflow duct (41), through which the prepared content flows out, **characterised by that** the separator (4) being tightly connected along its perimeter to the inner surface (7) of the casing (1), and the outflow from each hole (12) in the separator (4) being controlled by a pressure control valve (43).

2. The capsule according to Claim 1, **characterised by that** there is a bush (35), between the separator (4) and the upper barrier (2), fitted with openings (36) at its base for the liquid to flow out in order to mix the substance in a direction from the separator (4) towards the upper barrier (2).

3. The capsule according to Claim 1 or 2, **characterised by that** a pressure control valve (43), in the form of a diaphragm (44), is mounted in the mixing unit (15) and in its stationary position blocks the entire hole (12) section.

4. The capsule according to Claim 1 or 2 or 3, **characterised by that** the bush (35) and the separator (4) form one undetachable component.

5. The capsule according to Claim 1 or 2 or 3, **characterised by that** the bush (35) and the separator (4) can be detached from one another.

6. The capsule according to one of the Claims 1 - 5, **characterised by that** there is a mixing unit (15) guide (13) which is inside an area (8) of the separator (4) defined by a ring (9) fastened to the separator (4) at the base, and the guide (13) is seated in a recess (14) in the mixing unit (15), whose arms (20) have outflow holes (21) at the ends placed in the walls (40) of the recess (14) and connected to the central hole (22) of the punch (23) that punctures the barrier (3) which has at least one notch (45) in the centre of the casing (1) and where the punch (23) in its working position, after puncturing through the lower barrier (3), seals with its outer surface the resulting hole during the outflow of the prepared mix, and the generating line (a) of the punch (23) is longer than half the length (d) cut on the inside of the barrier (3), and the height (h) of the punch (23) is shorter than the height (H) of the casing (1) outflow duct (41).

7. The method of beverage preparation from a substance contained in a hermetically sealed capsule in an appliance for preparing beverages, where the said capsule has inside its casing (1) a separator (4) separating the upper part of the capsule interior situated between the separator (4) and the upper barrier (2) of the casing and where the said substance is contained in the upper part (39) and below the separator (4) there is a mixing unit (15) and an outflow duct (41) sealed by the lower barrier (3), and the method comprises inserting the capsule in the appliance for preparing beverages and opening it from the base, and then puncturing the upper barrier (2) and injecting liquid under pressure, according to Claims 1 - 6, **characterised by that** the liquid under pressure is injected through at least one pressure nozzle (34) into the central hole (28) of the bush (35) which is typically free of the substance used for beverage preparation, and in the lower part of the side wall of the bush (35) there is at least one opening (36) located in the immediate vicinity of the capsule separator (4) surface (37), through which the liquid under pressure is fed continuously from the base towards the upper part (39) of the casing (1) containing the said substance for the purpose of its dilution until at least one pressure control valve (43) through which the diluted substance flows into the mixing unit (15) opens and, when the beverage is finally mixed, it is discharged from the capsule through the central hole (22) in the mixing unit (15) punch (23) located in the outflow duct (41).
8. The method of beverage preparation from a substance contained in a hermetically sealed capsule in an appliance for preparing beverages, where the said capsule has inside its casing (1) a separator (4) separating the upper part (39) of the capsule interior situated between the separator (4) and the upper barrier (2) of the casing, where the said substance is contained in the upper part (39) and below the separator (4) there is a mixing unit (15) and an outflow duct (41) closed by the lower barrier (3), that comprises inserting the capsule in the appliance for preparing beverages and opening it from the base, and then puncturing the upper barrier (2) and injecting liquid under pressure, according to Claim 1 or 3 or 6, **characterised by that** the liquid under pressure is injected through at least one pressure nozzle (34) into the upper part (39) of the casing (1) containing the said substance for the purpose of its dilution until at least one pressure control valve (43) through which the diluted substance flows into the mixing unit (15) opens and when the beverage is finally mixed, the substance is discharged from the capsule (1) through the central hole (22) in the mixing unit (15) punch (23) located in the outflow duct (41).

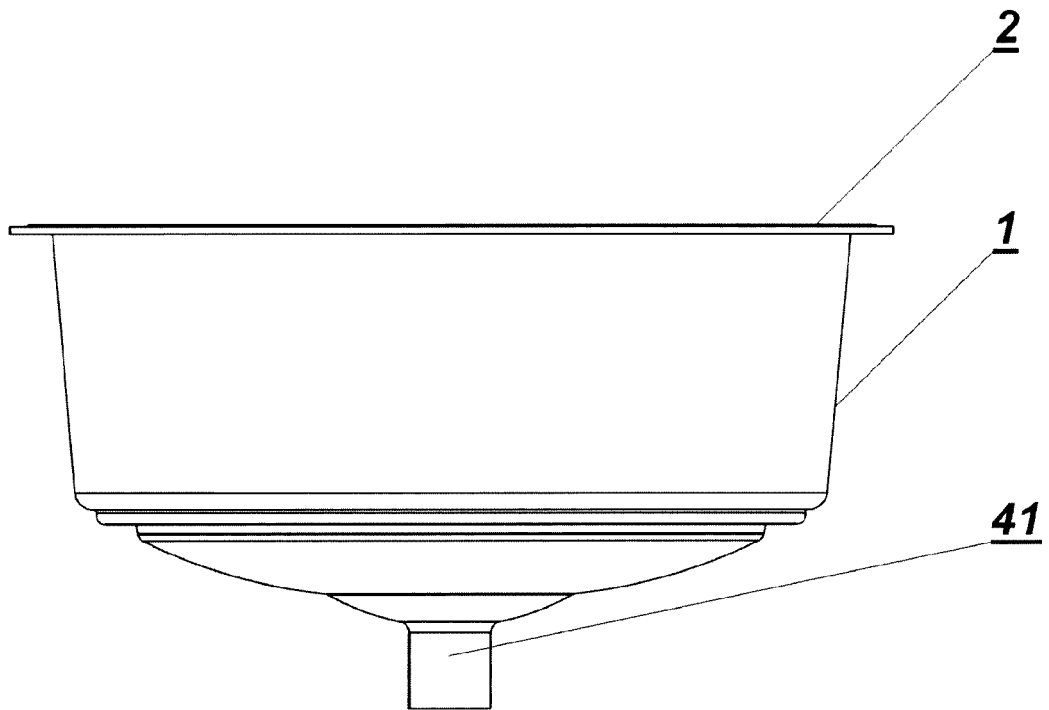


Fig. 1

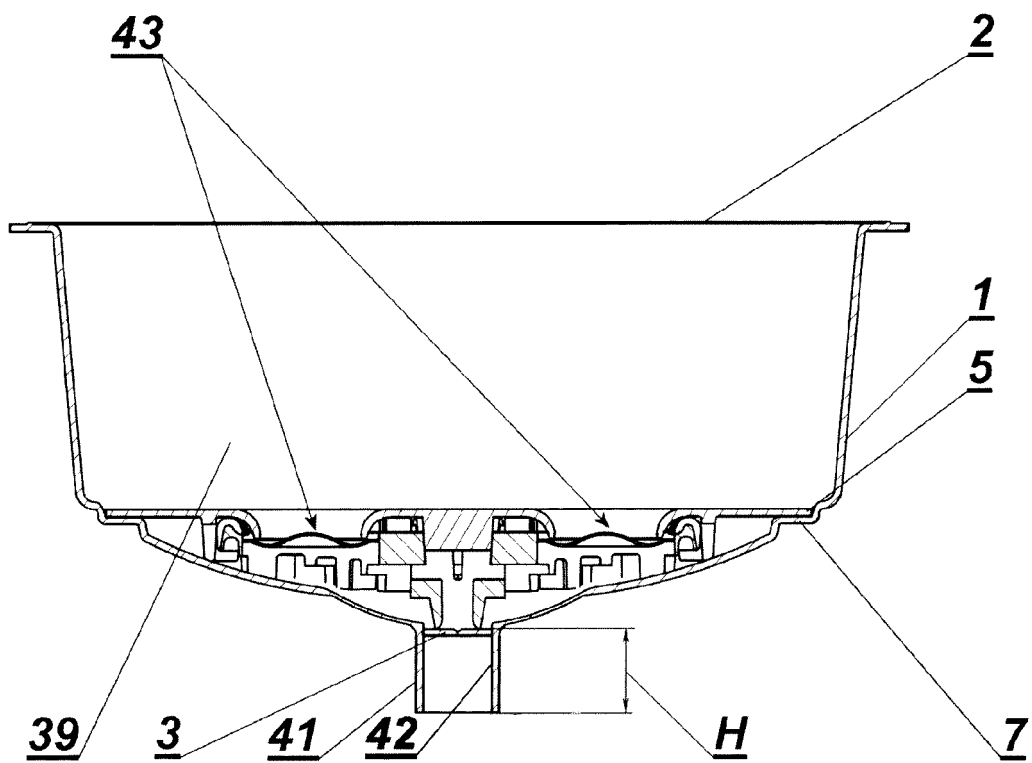


Fig. 2

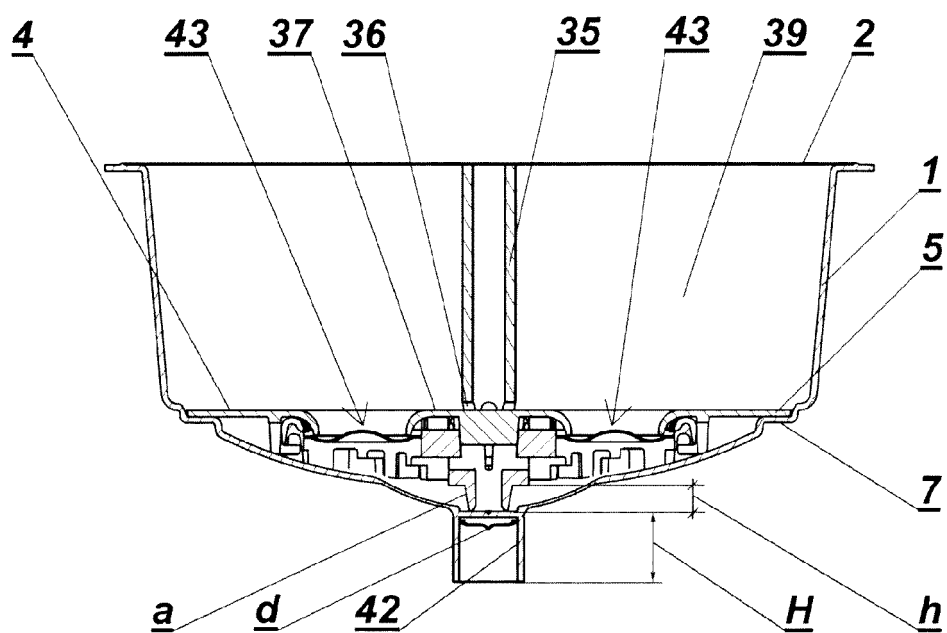


Fig. 3

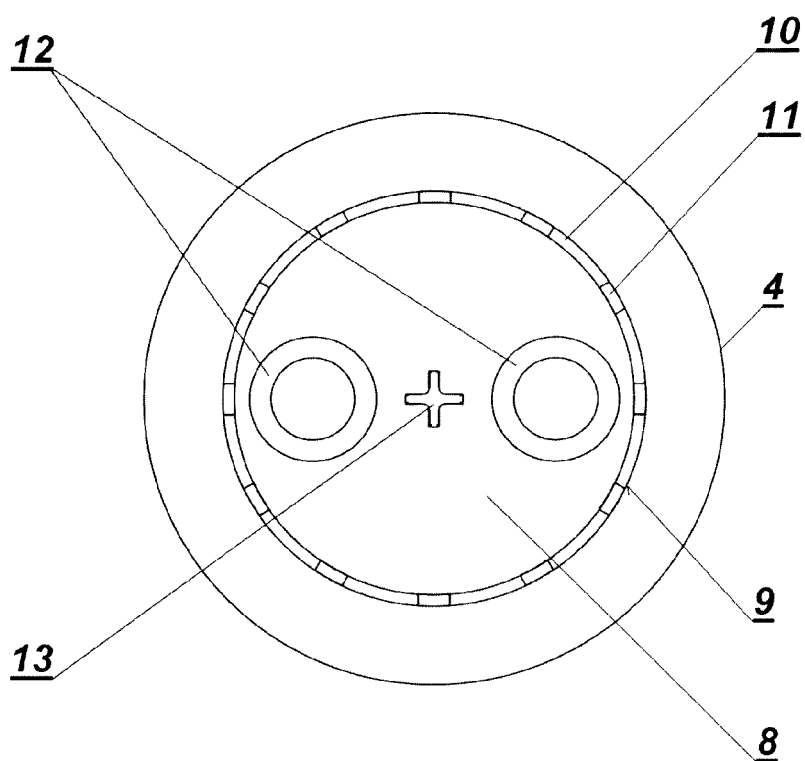


Fig. 4

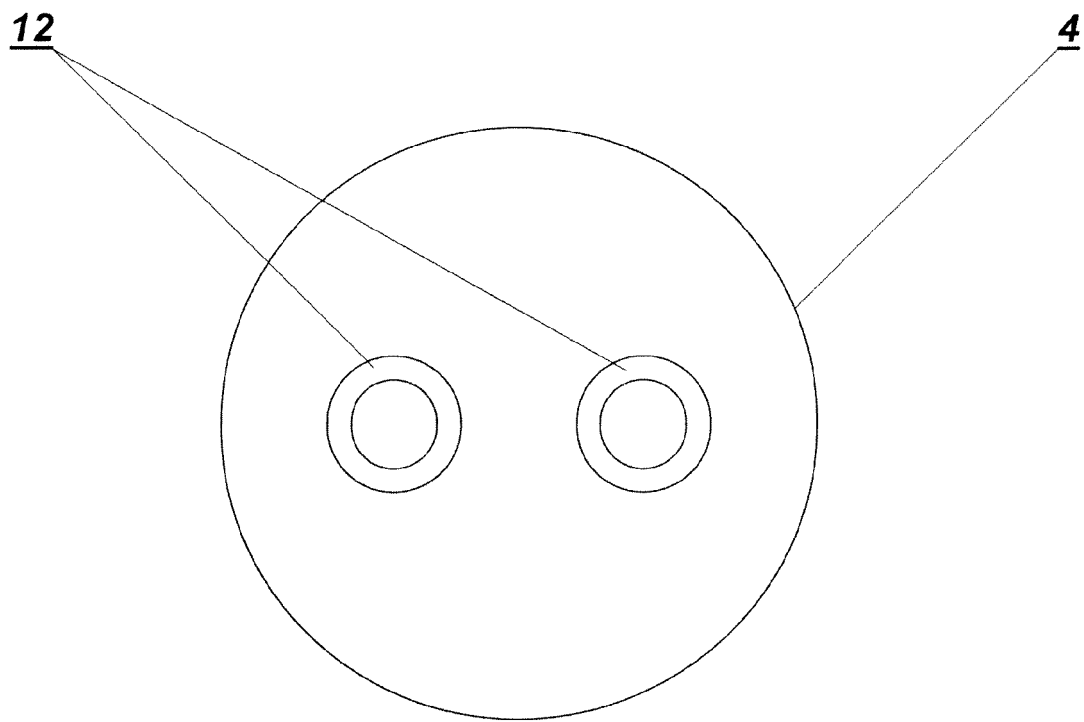


Fig. 5

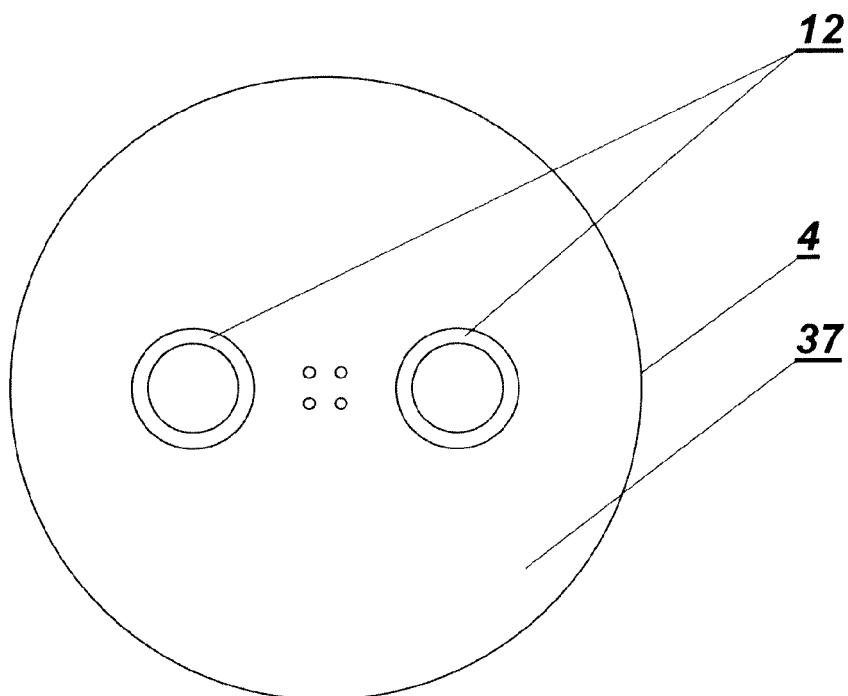


Fig. 6

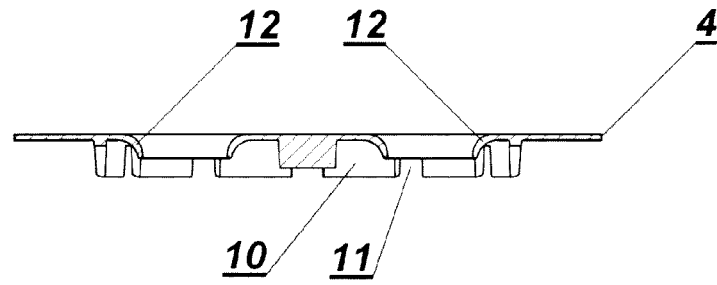


Fig. 7

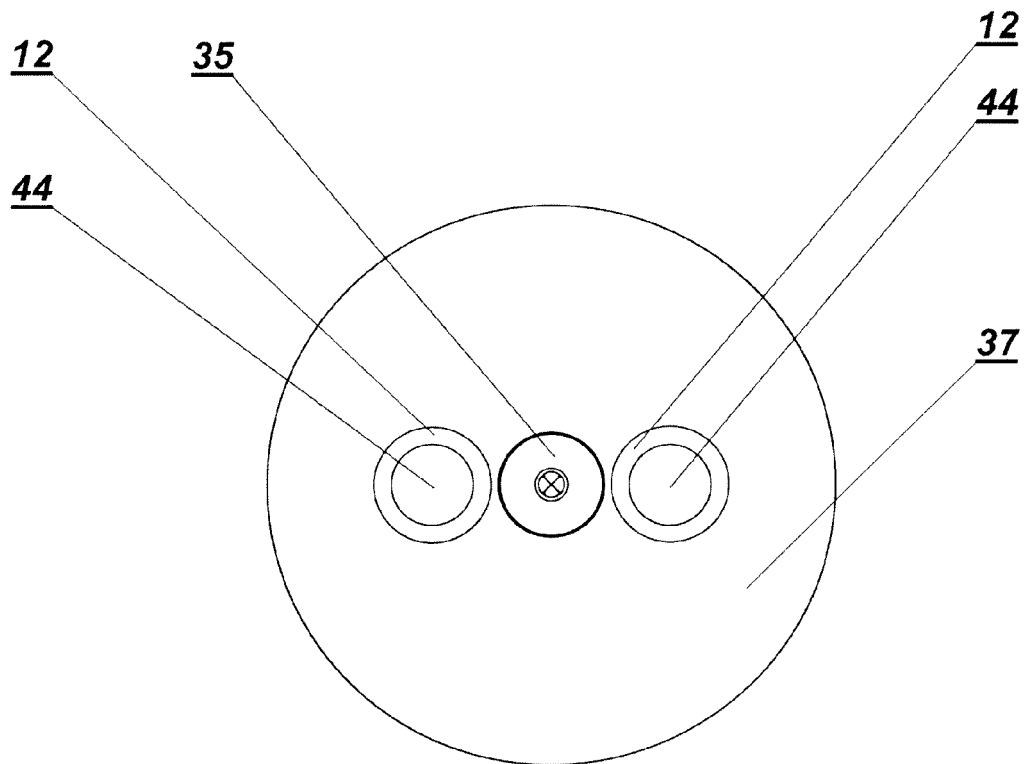


Fig. 8

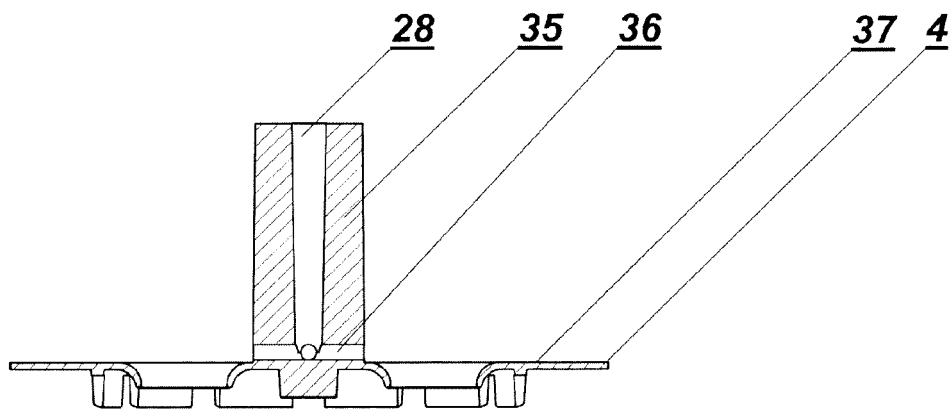


Fig. 9

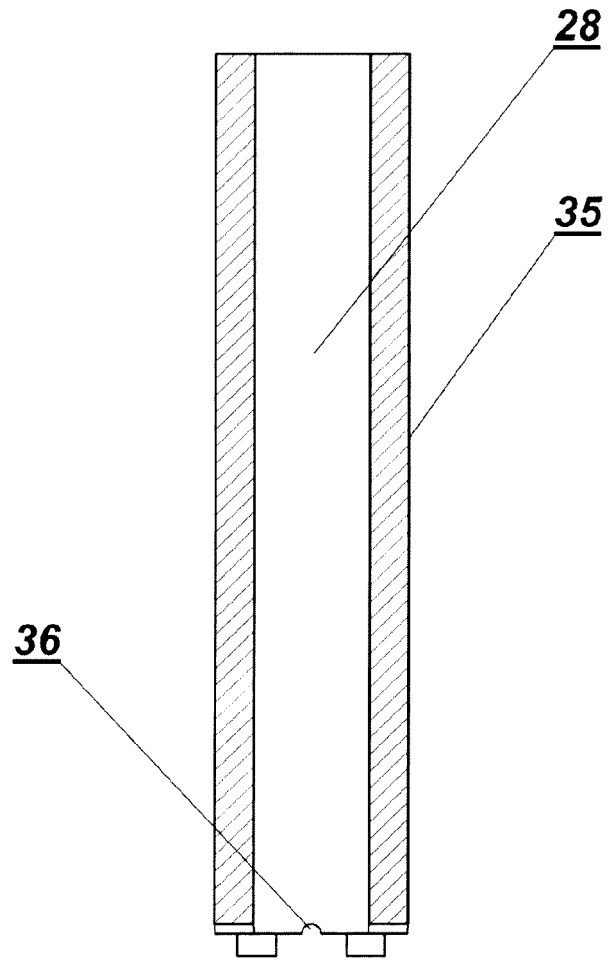


Fig. 10

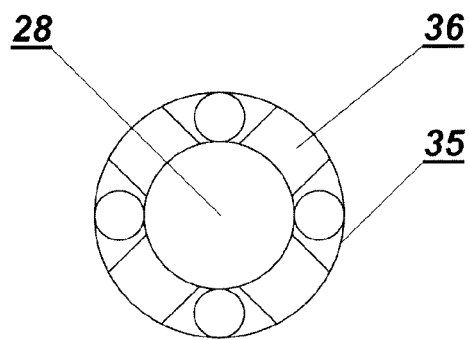


Fig. 11

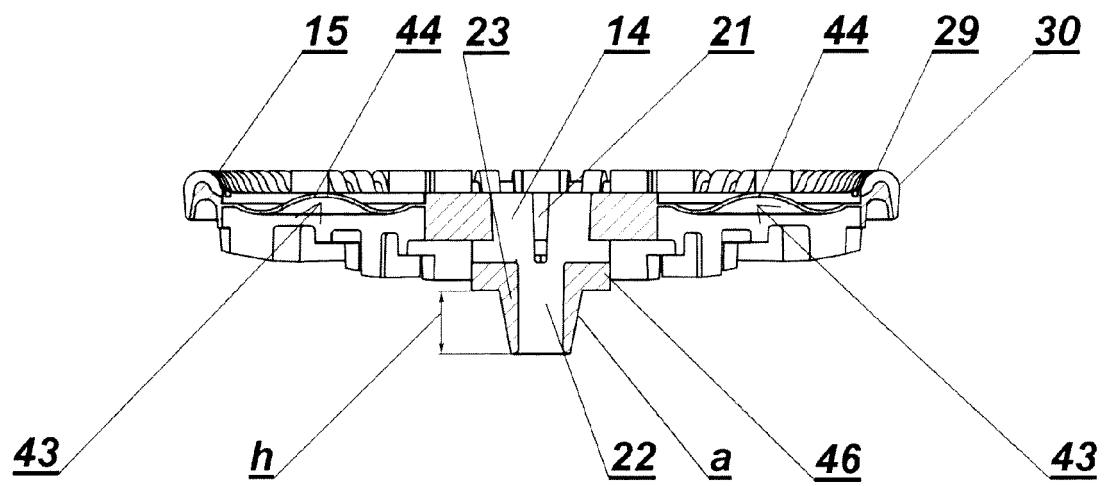


Fig. 12

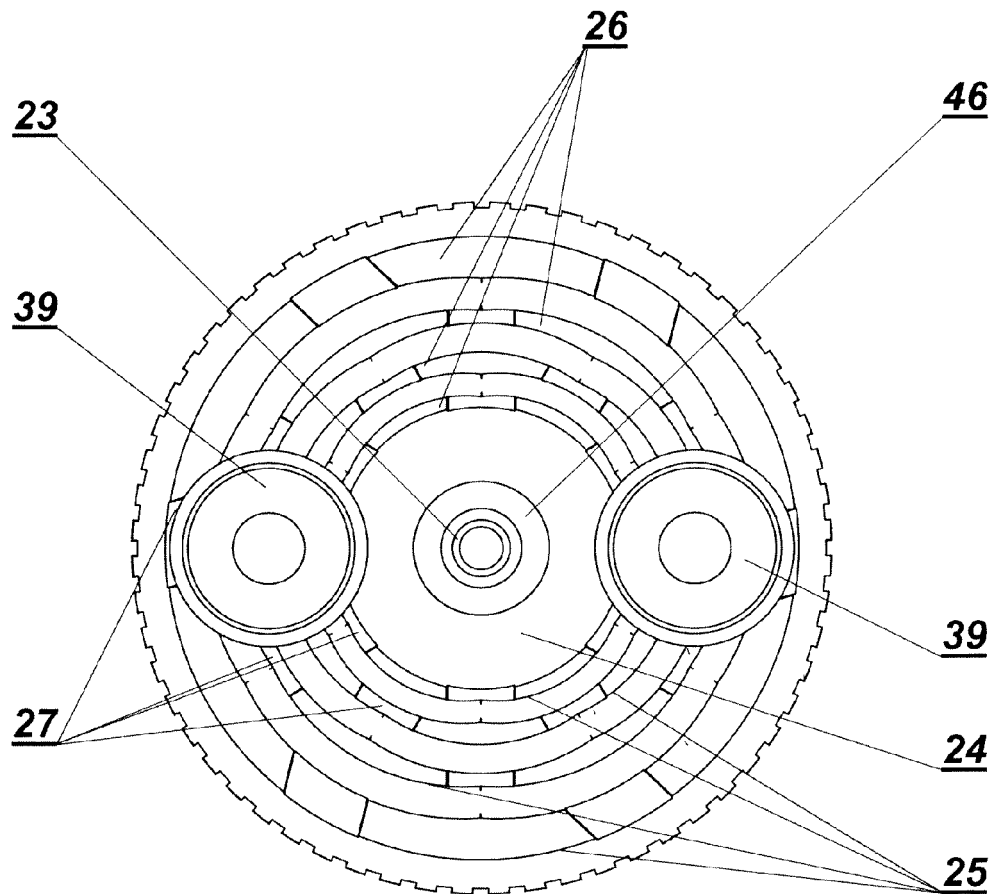


Fig. 13

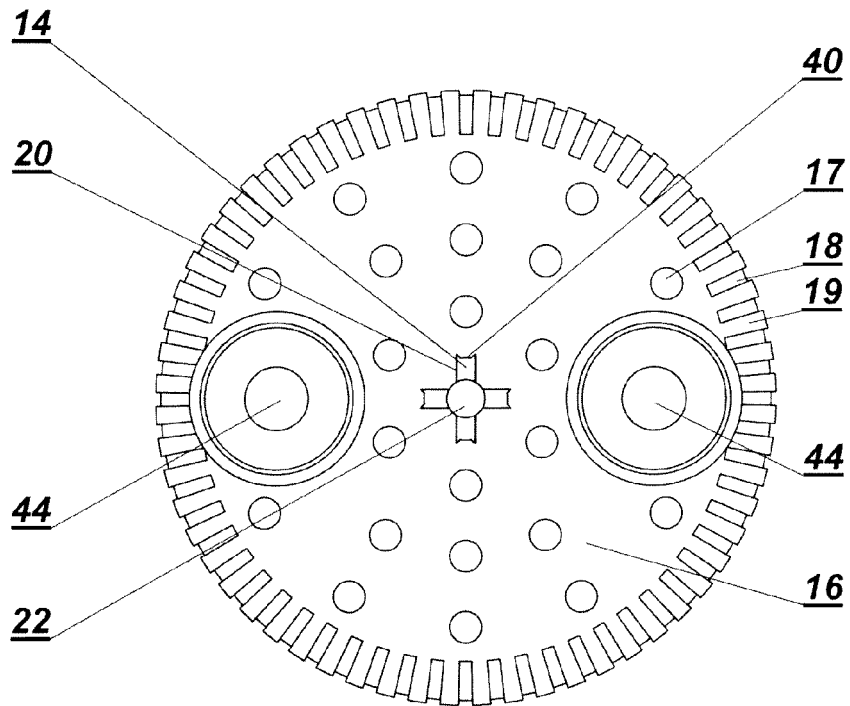


Fig. 14

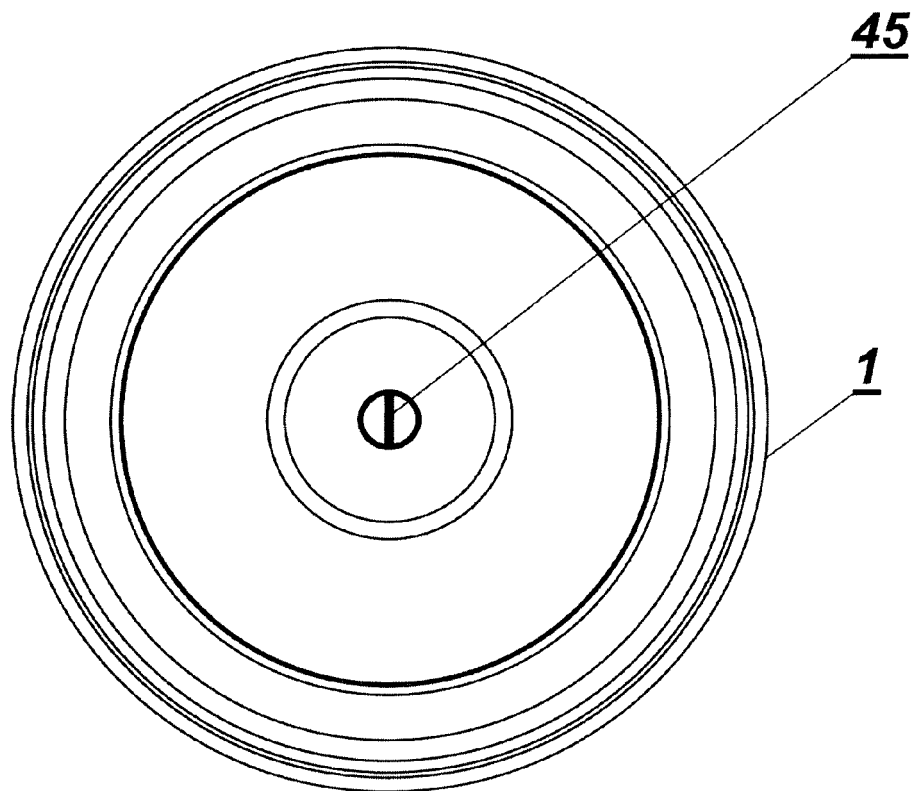


Fig. 15

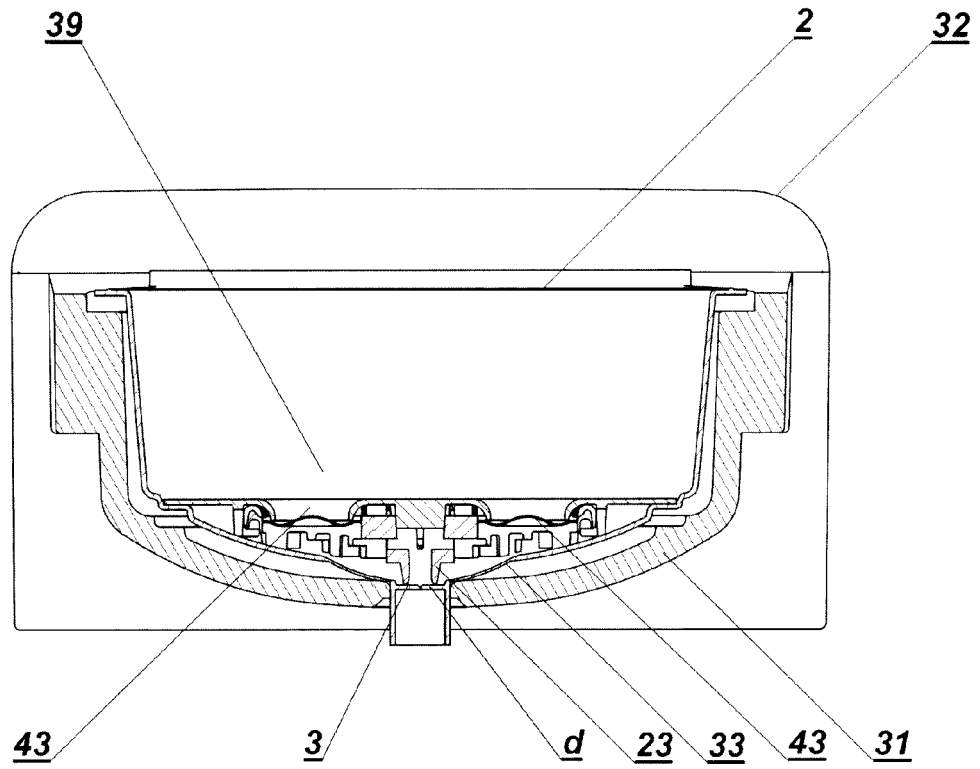


Fig. 16

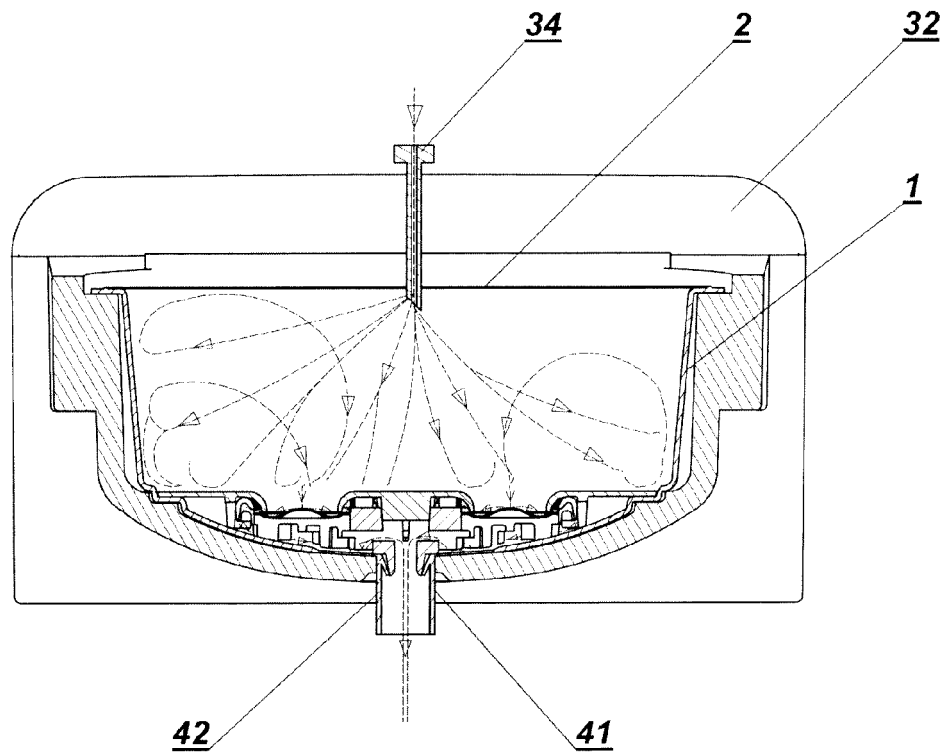


Fig. 17

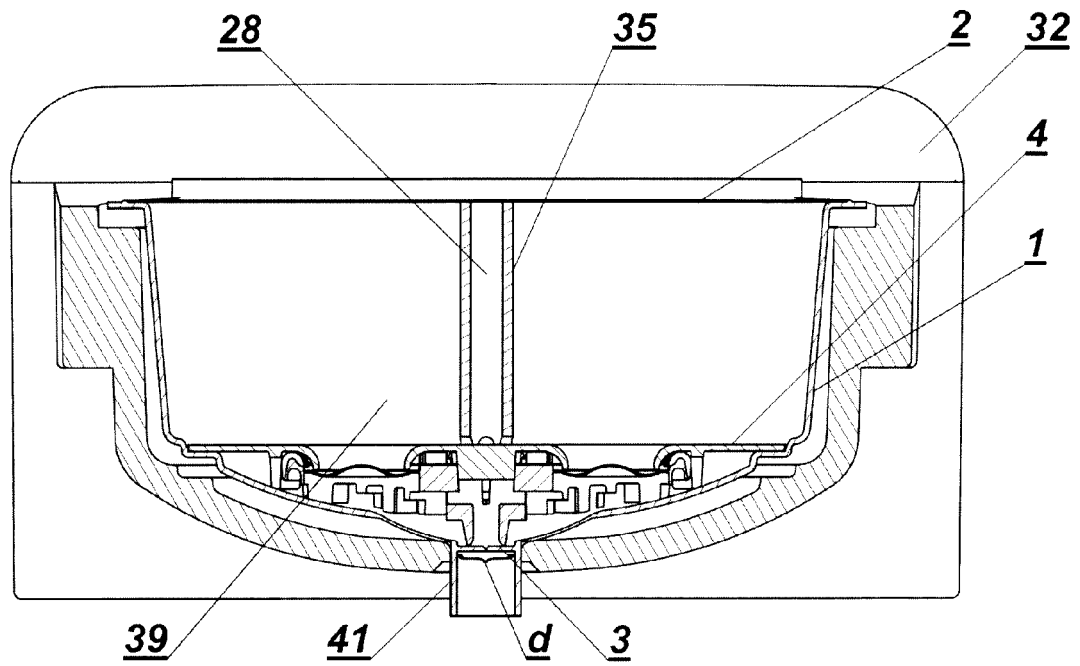


Fig. 18

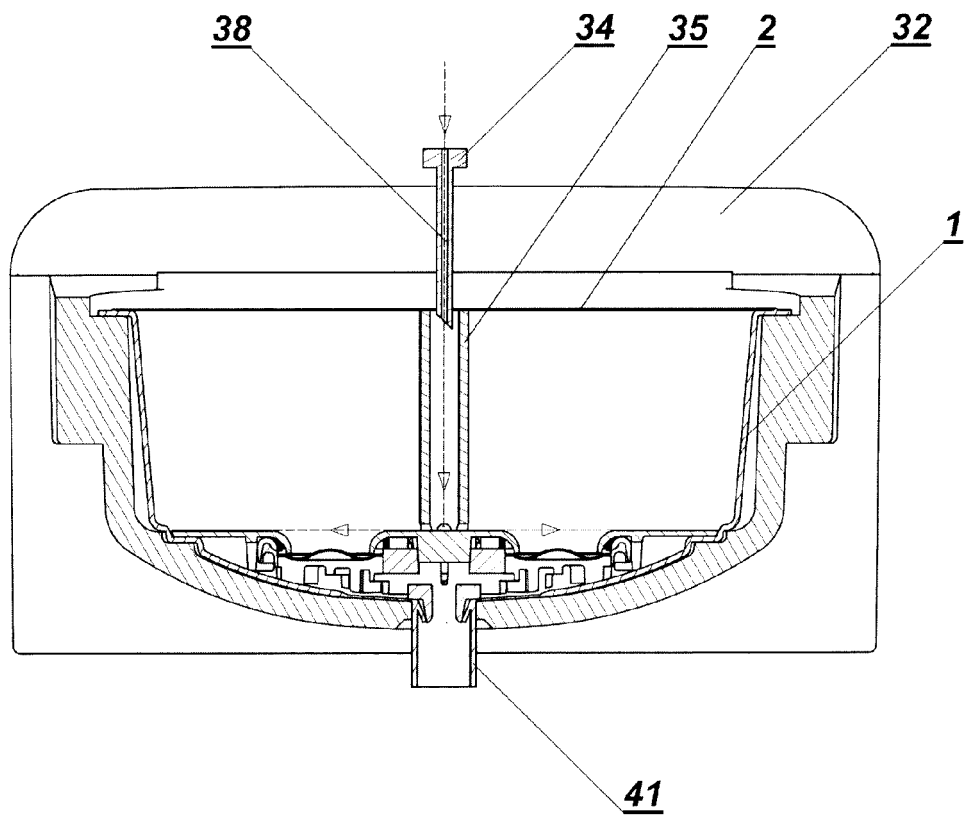


Fig. 19

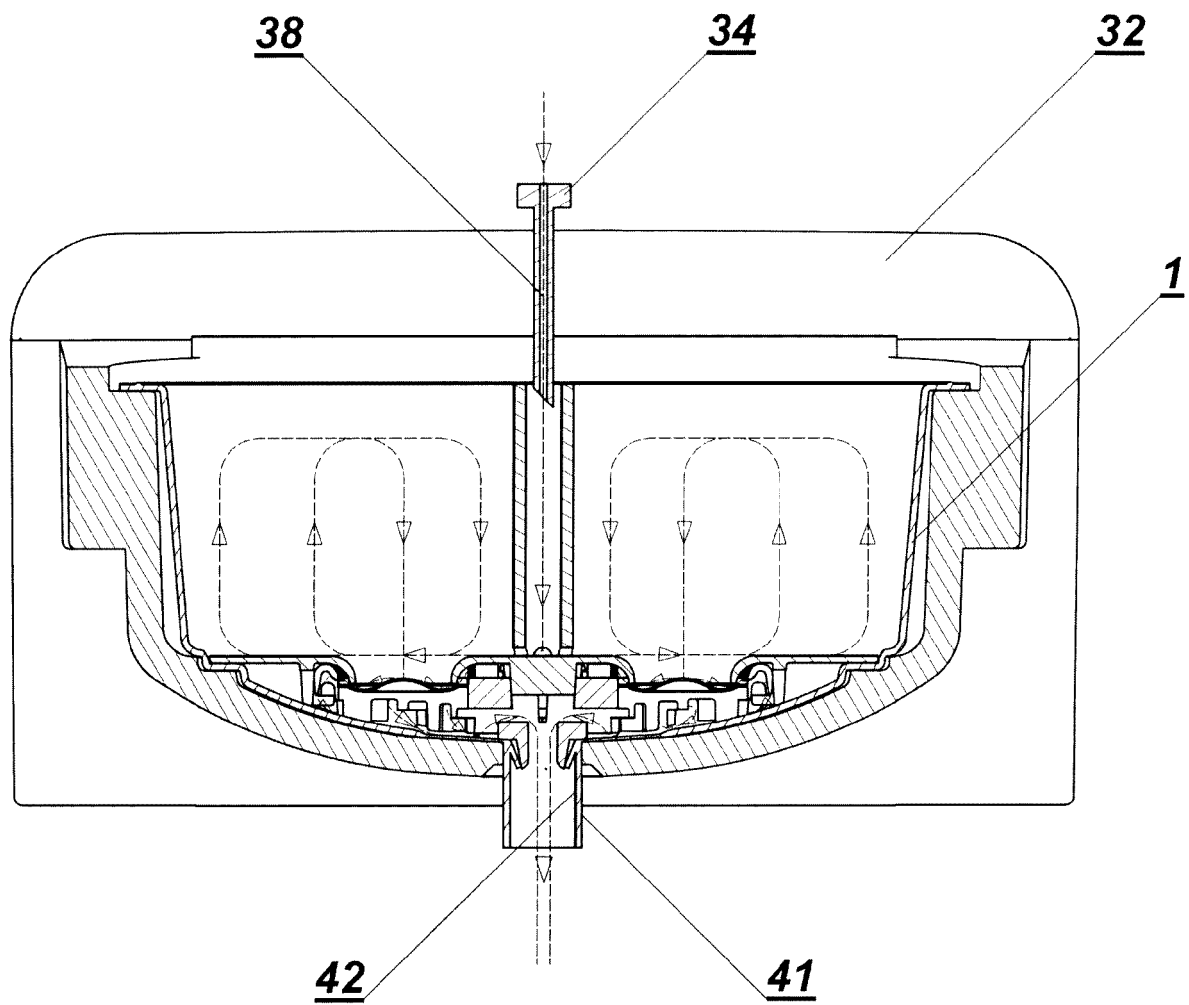


Fig. 20



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