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MIXING CONTAINER

Description

The invention concerns a mixing container according to the generic term of patent claim 1.

There are currently numerous shakers, mixing cups and drinking bottles known which are intended for mixing different substances. For mixing, powder is usually used as a food supplement and a liquid, which are often intended to increase athletic performance. These shakers, mixing cups or drinking bottles should enable or improve a good mixing of the powdery food supplements with the liquid. For this purpose, the substances to be mixed are filled into a mixing container and closed with a lid element. A mixing movement, preferably carried out by hand, mixes the substances in the mixing container into a dispersive liquid suitable for immediate drinking. However, such mixing containers can also be used for other mixing processes.

Such a mixing device is known from the US 2,776,120 A, which is preferably intended for mixing milk powder and water. This mixing device contains a cylindrical container which can be closed by a flat lid. An inwardly directed mixing device is fixed to the lid, preferably by means of a suction cup. The mixing device consists of a helical wire coil whose diameter fills approx. 1/2 to 2/3 of the inner diameter of the cylindrical container. At the lower end of the helical wire spiral, it is formed into a flat spiral spiral, which ends in a circular opening in the centre. The wire coil consists of a spring-elastic material, which is arranged underneath the lid in the resting state and preferably fills 1/5 of the axial height of the cylindrical container, as the helical wire turns lie close to each other. To mix the milk powder with the water liquid, it is first filled into the cylindrical container and closed by the lid with the mixing device. For mixing, the container is preferably shaken by hand so that the spiral moves by its own weight and elasticity into an axially extended position to the bottom of the container and then swings back again, mixing the milk powder with the water. Although the spiral passes through the entire length of the contain-

er, lumps of powder may be stuck to the walls or floor, which cannot be reached through the spiral and are therefore not completely mixed with the water.

From US 6,379,032 B1 an agitator is known which is also intended for mixing a powder in a liquid. The agitator is inserted into a cylindrical container which can be closed by a screwable lid. The agitator comprises a wire frame element which is formed into a defined shape, preferably as a ball, which leaves gaps on the surface through which the liquid with the powder can flow into and out of the hollow space of the wire frame element. In the cavity of this wire frame element, a smaller internal agitator is additionally provided, which can move back and forth in the cavity of the wire frame element and thus causes additional turbulence during the mixing process. A mixing device is provided in which the wire frame element is wound with a single wire as a spiral-shaped mixing element to form a spherical object. For this purpose, the inner agitator is preferably a similarly spirally wound spherical object with a smaller diameter, which is located in the inner cavity of the wire frame element. To mix the liquid with the powder, the powder is filled through the open lid into the interior of the mixing container, which contains at least one agitator with its internal agitator. After closing the lid, the container is preferably shaken by hand, which causes the agitator to move back and forth within the container by its own weight. This causes the liquid to flow into and out of the interior of the wire element at least through the gaps in the wire frame element and is also swirled by the inner mixing element. Even if the ball-like agitators can hit almost all inner jacket parts of the container during the shaking process, a relatively long mixing process is necessary to pass through the entire interior of the container up to its inner walls in order to ensure uniform mixing of the powder with the liquid.

Other relevant state of the art documents are: US 2008/259723, US 2 776 120, DE 10 2008 055787, WHERE 2012/096990, DE 20 2013 001192

A drinking container is known from EP 2 341 807 B1, in the interior of which a mixing device is attached to the container opening. The mixing device consists of a wire element which is designed as a flat elastic spiral and which, due to its own weight, can move freely in the axial direction inside the vessel. To mix a liquid with a powder, both are filled into the interior of the drinking container and then the mixing device is clamped at the upper edge of the drinking container and the contain-

er opening is closed by a cover element. If the drinking container is now shaken by hand, the flat elastic spiral dips axially from the top into the interior of the container to the bottom and mixes the powder with the liquid. In the upper part of the drinking container in particular, it can happen that powder lumps adhere to the inner walls, which are difficult to reach from the spiral fixed at the top and then require a longer mixing process.

The invention is therefore based on the task of improving the mixing vessels of the type mentioned above in such a way that the substances to be mixed can be mixed evenly and quickly with the liquid and that as far as possible no powdery substances can adhere to the inner walls of the vessel over a longer mixing period.

This problem is solved by the invention indicated in patent claim 1. Further training and advantageous examples of the invention are given in the subclaims.

The invention has the advantage that almost the entire inner diameter of the cylinder interior is filled by the at least two spiral-shaped spiral parts and therefore these two spiral parts act like a sieve and any clumps in the liquid are dissolved after an up and down movement. At the same time, any buildup on the inner side walls is removed by the outer diameter of the two helical and/or helical spiral parts, which is adapted to the inner diameter of the cylinder interior, and advantageously mixed with the liquid.

The invention also has the advantage that the at least two helical spiral parts and the helical spiral part arranged between them mean that at least the two spiral parts adapted to the inner diameter of the container are arranged at a distance from each other, thus providing guidance inside the container. The mixing element thus slides through the entire axial length of the container by its own weight and an external shaking process, thus sieving the entire interior of the container and distributing the substances to be mixed very evenly in the liquid. By briefly shaking the mixing container, powdery food supplements, for example, can be dissolved or mixed in a liquid in such a way that a dispersive drinking liquid can be produced quickly.

At the same time, the invention has the advantage that the two helical and helical spiral parts make it easy to produce a one-piece mixing element, which can be produced by a single winding process using a metal wire. Such mixing elements made of a wound wire are advantageously easy to insert into the mixing container even after the filling process or to remove after emptying and thus easily to feed for automatic cleaning. Such mixing elements made of a metal wire also have the advantage that they can be produced both rigid and elastic. Spring elastic mixing elements in particular have the advantage that powder lumps or caking adhering to them can easily be loosened by a spring elastic change in shape during the shaking process of wire.

The invention of the mixing container with the mixing element adapted to the diameter of the interior also has the advantage that the cylindrical container can also be designed as a drinking bottle, the lid of which also has a closable drinking spout, so that the liquid briefly mixed with a food supplement can be drunk immediately without the need for a refilling process of the mixed drinking liquid.

The invention of the mixing container according to patent claim 6 with the mixing element without the screw-shaped spiral parts has the advantage that this is easy to produce and that the central passage in the screw-shaped spiral parts can be closed in a simple way so that the sieving function is improved. Three or more spiral parts can be fixed to such a hollow body in a simple way, so that the guidance in the cylindrical container is improved at the same time and the sieving function is multiplied, whereby a high mixing effect can be achieved by few shaking processes.

In the case of a special version of the invention, it is additionally provided that a hollow body is fixed inside the helical spiral part. This also has the advantage that the central opening in the mixing element can be closed, which improves the sieving function of the mixing element. At the same time, coolant can be introduced into this hollow body to cool down a drinking liquid during the mixing process. Furthermore, portable pH sticks can be arranged in these hollow bodies, through which the liquid can be brought into a desired pH state, whereby the hollow space of the hollow body is made accessible through opening slots or opening holes.

Furthermore, soluble drug additives can be entered into the hollow body, which are to be taken simultaneously with the liquid. Advantageously, it is also conceivable to introduce additional weight elements into the cavity, in which the mixing of the drinking liquid can be adapted to the viscosity of the substances to be mixed and thus shortened.

In the case of another special version of the invention, it is also planned to attach one or more screw-on additional containers to the lower part of the mixing container. This has the advantage that the miscible substances can be stored in it during mobile operation and can be filled into the drinking container as required in the simplest way.

The invention is explained in more detail using an execution example shown in the drawing. Show it:

Fig. 1: An exploded view of a mixing bottle with a drinking cap, a mixing element, a drinking container and three additional containers;

Fig. 2: A mixing element with a central inner helical spiral part;

Fig. 3: A mixing element with a coaxial outer helical spiral part;

Fig. 4: A mixing element with a central hollow body fixed in the central inner helical part;

Fig. 5: a hollow body made of plastic material, and

Fig. 6: A mixing element with two helical spiral parts and a central hollow body arranged between them.

Fig. 1 of the drawing shows a mixing container which is formed as a mixing bottle with a cylindrical container part 1, in which a mixing element 3 adapted to the inner diameter of the mixing bottle is arranged so as to be axially movable, which mixing element 3 has two axially spaced helical spiral parts 4.5 and between which a hel-

ical spiral part 6 of smaller diameter is arranged centrally, a hollow body 9 of plastic material being fixed in the helical spiral part 6, and the drinking container being closable as a lid element by a lid-shaped drinking closure 2.

The drinking container consists of a cylindrical container part 1, which has a constant inner diameter and is closed at the bottom by a base area 10. A first external thread 12 is attached to the upper container opening 11, which can be closed with a cover element 2 with internal thread. The drinking container 1 is preferably made of plastic material, but can also be made of metal or glass. Furthermore, the drinking container 1 contains a second external thread 13 at its lower base 10, to which preferably additional containers 14,15,16 can be screwed.

In the version shown, the drinking container 1 preferably contains three additional containers 14,15,16 which have at least one internal thread with which they can be connected to the drinking container 1 or a further additional container 14,15,16. These additional containers 14,
15,16 are also preferably made of plastic material and are used for the absorption of miscible food supplements, pH sticks or drug additives. In addition, the mixing element 3 can also be accommodated in one of the additional containers 14,15,16, so that it only has to be inserted into the container interior 8 during the mixing process and thus does not glide back and forth in the mixing liquid or strike against the walls during mobile operation.

To close the container part 1, a screwable drinking cap is provided as cover element 2, which has an internal thread that can be screwed liquid-tight to the first external thread 12 of the mixing or drinking bottle. So that the drinking liquid mixed with a food supplement or the like can be drunk immediately after the mixing process, the drinking cap 2 additionally contains a drinking spout 17, which is connected to the interior of the drinking bottle through an opening. For sealing during mobile operation and the mixing process, a swivelling closure bow 18 is additionally arranged on the drinking spout 2, which contains a ball-shaped closure body 19, which is adapted to the opening of the drinking spout 17 in cross-section and closes the spout positively and non-positively by means of a friction connection.

For mixing a drinking liquid preferably with a powdery food supplement, the mixing element 3 shown can be used inside the mixing or drinking container. This mixing element 3 consists of a wound wire coil 20, preferably a round metal wire of 1 to 3 mm diameter.

The mixing element consisting of a continuous wire helix 20 is shown in detail in Fig. 2 of the drawing. This mixing element 3 consists of two flat, spaced spiral-shaped spiral parts 4.5, the outer diameter of which is adapted to the inner diameter of drinking vessel 1 as the container part. The outer diameter of the two spaced screw spirals 4.5 is approx. 0.1 to 1 mm smaller than the inner diameter of the drinking vessel 1, so that a sliding gap 7 is formed. To connect the two helical spiral parts 4.5, the helical spiral part 6 is arranged in the centre of the mixing element 3, the diameter of which is approx. 1/5 to 1/3 of the outer diameter of the helical spiral 4.5.

The mixing element 3 wound from the wire coil 20 preferably consists of corrosion-resistant stainless steel or comparable material. The wound steel wire creates a mixing element 3 which is rigid or has a low elasticity, so that the outer shape can only be changed slightly elastically during the mixing process. Such a mixing element 3 may also consist of three or more helical spiral parts 4,5 connected by several central helical spiral parts 6. A round wire is preferably provided as the wire, whereby the one-piece mixing element 3 can also consist of a polygonal wire by means of which the inner surfaces of the drinking vessel 1 can preferably be better removed from adhering powder residues by means of its edges for more uniform mixing. Since the helical spiral parts 4.5 simultaneously perform a sieving function during mixing, their radial wire spacings are preferably 1 to 10 mm, and leave in the centre 22 a central passage 23 of approx. 5 to 30 mm diameter.

Fig. 3 of the drawing shows a further version of the mixing element 3 in which the two spaced spiral-shaped spiral parts4,5 are axially connected to an outer coaxial spiral-shaped spiral part 6. This mixing element 3 is also designed as a one-piece wire coil 20, in which the two axially spaced spiral-shaped spiral parts 4.5 end in the centre 22 and are wound from there, so that its central passage 23 is generally smaller than the mixing element 3 according to Fig. 2. This can easily improve the

mixing effect, which is preferably produced by the spiral parts 4.5. Since the helical spiral parts 4.5 act like a sieve, their radial distances 21 from each other can be adapted to the substances to be mixed. In the case of powdered food supplements, the radial distances 21 between the individual screw flights are ideally only 3 to 5 mm in order to avoid buildup and achieve a good mixing effect. The axial distances between the helical gears are preferably 5 to 15 mm. With the mixing element according to Fig. 3, both the outer diameter of the helical spiral parts 4.5 and the outer diameter of the helical spiral part 6 have the same size and are adapted to the inner diameter with respect to a sliding gap 7. In the case of standard drinking bottles, an outer diameter of approx. 50 to 100 mm is provided, with mixing elements 3 preferably having a height of approx. 50 to approx. 100 mm for drinking bottle heights of approx. 150 to 200 mm.

For a special version of the mixing element 3 according to Fig. 2 of the drawing, a hollow body 9 made of plastic material is additionally fixed in the centre 22 within the helical spiral part 6, which is shown in Fig. 4 of the drawing. The hollow body 9 is of cylindrical design, the outer diameter of which is adapted to the inner diameter of the helical spiral part 6 and is also fixed to it by a friction connection. Furthermore, the hollow body 9 contains two cover elements 24, the diameter of which is preferably increased by the wire diameter compared to the outer diameter of the cylinder part 25. One of the cover elements 24 is preferably designed as a screw part with external thread, which can be tightly screwed into the internal thread of the hollow body 9. Therefore, the hollow body 9 can easily be inserted into the central passage 23 of the helical spiral part 6 and fixed in place by screwing on a cover element 24.

This hollow body 9 is preferably made of a plastic material that is easy to produce, but can also be made of metal or ceramic. The interior of the hollow body 9 can preferably be sealed moisture-tight by at least one of the cover elements 24 so that coolant or additional weight parts can be introduced into it.

The design of this hollow body 9 is shown in detail in Fig. 5 of the drawing. In this version, the lower cover element 24 is firmly connected to the cylindrical hollow body 9, while the upper cover element 24 contains a threaded lock and can there-

fore be released. In the case of a special design of this hollow body 9, there may be 25 passage openings in both the cover element 24 and the cylinder part, through which the drinking liquid can penetrate into the interior. With such a design, it is intended to insert 9 pH sticks into the interior of the hollow body, which can be used to change the pH value of the drinking liquid. With such a design it is also conceivable to introduce medicinal additives into the interior of the cylinder part 25, which can be dissolved in the drinking liquid and which are to be absorbed with it.

A simplified alternative design of a mixing element 3 is shown in Fig. 6 of the drawing. The mixing element 3 only consists of two axially spaced spiral-shaped parts 4.5, which are axially connected to each other only by the central hollow body 9. Both the helical spiral parts 4.5 and the hollow body 9 arranged between them are designed as already described for the mixing elements 3 of Figs. 2 to 5. However, after unscrewing a cover element 24, the helical spiral parts 4.5 are pushed onto the cylinder part 25 of the hollow body 9 and fixed in the area of the central passage 23 by a clamping force with the cylinder part 25. For a better hold, grooves can also be made on the outer surface of the cylinder part 25, into which the inner wire coils 20 of the spiral parts 4.5 can be snapped. It is also possible to attach more than two spiral parts 4.5 to the cylinder part 25 in order to improve the sieving effect and the guidance within the tank interior 8. With such a hollow body 9 it is also possible to easily adjust the length of the mixing elements 3 to the respective cylindrical containers 1. In practice, it is advantageous to keep cylindrical containers 1 of different sizes for different tasks, which preferably can only vary in length. Thus different cylinder parts 25 are provided, which only differ in their length and so the mixing elements 3 are adapted to the respective cylindrical containers 1 according to their length.

To mix a liquid preferably with a powdery substance, these are first filled into the interior of the container 8 one after the other. Before or after this, the mixing element 3 is inserted axially sliding into the vessel interior 8, where it sinks downwards due to its own weight. The container 1 is then sealed liquid-tight by a lid element 2 or a drinking cap. For mixing, the entire mixing container is then preferably shaken in the axial direction so that the mixing element 3 moves axially from

the bottom of the base 10 to the lid element 2 and back again due to its own weight and the shaking movement within the interior 8 of the container 1. This means that the entire quantity of liquid with the substance to be mixed flows through the two or more helical spiral parts 4.5, which act like a sieve, in a single reciprocating shaking process. This dissolves the agglutinations formed in the liquid in a simple way and the adhesions on the side walls and in the base and lid area are also dissolved and mixed evenly with the liquid. For this reason, good mixing results can be achieved with a few shaking movements, and at the same time, adhesions on the inner side walls as well as in the base and lid area can be removed by striking the mixing element 3.

Since such helical and helical spiral parts can be produced cost-effectively by a simple winding process, such mixing elements can be mixed together again at any time to form a uniform dispersion, not only for the production of drinking liquids, but also for the mixing of colour pigments or other chemical substances in corresponding mixing containers, even after a settling process.

PATENTKRAV

1. Blandingbeholder med en indre cylindrisk beholder (1) med et forsegleligt låg øverst (2) og en indvendigt aksialt bevægeligt anbragt blandeelement (3), **kendetegnet ved at**
blandingselementet indeholder (3) mindst to spiralformede spiraldele (4, 5) med mindst en skrueformet spiraldel (6) placeret mellem de sig, bestående af mindst et stykke trådspiral (20) og som gennem dens spiralformet (4,5) og / eller skrueformet spiraldele (6) er tilpasset til ydersiden af beholderens (1) indvendige diameter, mens der opretholdes et lille glidestykke (7),
hvorved blandeelementet (3) har en aksial længde på mindst 1/4 til 2/3 af beholderens indre højde (8).

2. Blandingsbeholder ifølge krav 1, **kendetegnes ved,** at blandingselementet (3) omfatter to aksialt adskilte spiralformede spiraldele (4.5), som har en ydre diameter der er ca. 0,1 mm til 1 mm mindre end den indre diameter af beholderens indre (8) og indbefatter et centralt spiralformet spiralelement (6), hvis ydre diameter er ca. 1/5 til 1/3 af de spiralformede spiraldeles (4, 5) ydre diameter.

3. Blandingsbeholder ifølge krav 1, **kendetegnes ved,** at blandingselementet (3) omfatter to aksialt adskilte spiralformede spiraldele (4.5), som har en ydre diameter der er ca. 0,1 mm til 1 mm mindre end den indre diameter af beholderens indre (8) og indbefatter et koaksialt, udvendigt spiralformet spiralelement, hvis ydre diameter svarer til de spiralformede spiraldeles (4, 5) ydre diameter.

4. Blandingsbeholder ifølge et af de foregående krav, **kendetegnes ved**, at blandingselementet (3) består af et udelt viklet trådspiral (20), hvor trådens tværsnit er rundt eller firkantet.

5. Blandingsbeholder ifølge et af de foregående krav, **kendetegnes ved**, at der i midten (22) af de skrueformede spiralelementer (6) og de spiralformede spiralelementerne (4,5) er et udfyldbart hulrum fyldes hule legeme (9) er fastgjort.

6. Blandingsbeholder med en indre cylindrisk beholder (1) med et forsegleligt låg øverst (2) og en indvendigt aksialt bevægeligt anbragt blandeelement (3), **kendetegnet ved at** blandingselementet (3) mindst to spiralformede oprullede dele (4, 5) og en aksialt anbragt mellem hule legeme (9), hvor de skrueformede spiraldele (4,5) består af en trådspiral (20) og de spiralformede spiraldele (4,5) er tilpasset den indvendige diameter af beholderen (1) und hensyntagen til en lille glidespalte (7) hvor blandeelementet (3) har en aksial længde på mindst 1/4 til 2/3 af beholderens indre højde (8).

7. Blandingsbeholder ifølge krav 6, **kendetegnes ved**, at det hule legeme (9) består af en lukbar cylindrisk del (25), der er anbragt aksialt mellem de to spiralformede spiraldele (4,5).

8. Blandingsbeholder ifølge krav 7, **kendetegnes ved**, at den hule cylinderdel (25) indeholder flere passageåbninger for tilstrømning og udstrømning af blandingsvæsken.

9. Blandingsbeholder ifølge et af kravene 6 til 8, **kendetegnes ved**, at det hule legeme (9) består af et plast- eller metalmateriale.

10. Blandingsbeholder ifølge et af kravene 6 til 9, **kendetegnes ved**, at den udvendige diameter af det hule legeme (9) svarer til den indvendige diameter af den centrale spiralformede spiraldel (6) og har to dækelementer (24), hvis udvendige diameter er større end den indre diameter af den spiralformede spiraldel (6), hvor mindst et af de to dækelementer (24) kan skrues sammen med den hule cylindriske del (25).

11. Blandingsbeholder ifølge et af de foregående krav, **kendetegnes ved**, at dette er udformet som en flaske, hvor den cylindriske beholder (1) har et første udvendigt gevind (12), kan skrues fast med det indvendige gevind på et låg (2) som et tæt dæksel, hvorved låget (2) omfatter en drikkestuds (17), som er forbundet med beholderen indre rum (8) gennem en rund åbning, og låget (2) en har drejelig låsebøjle (18), hvormed drikkestudsen (17) kan åbnes og lukkes.

Fig. 1

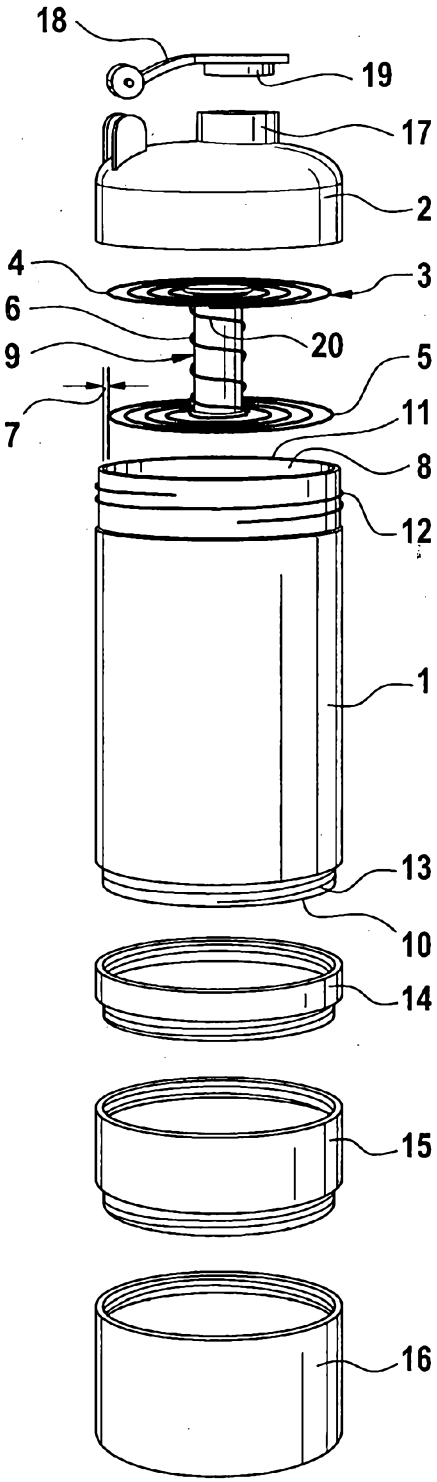

Fig. 2

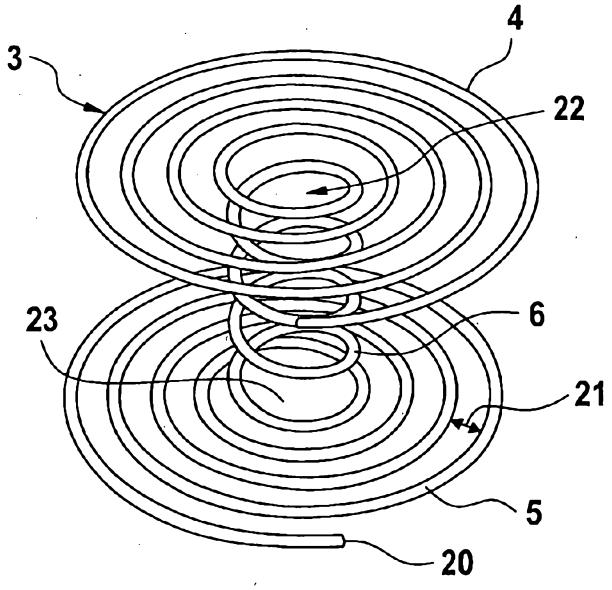

Fig. 3

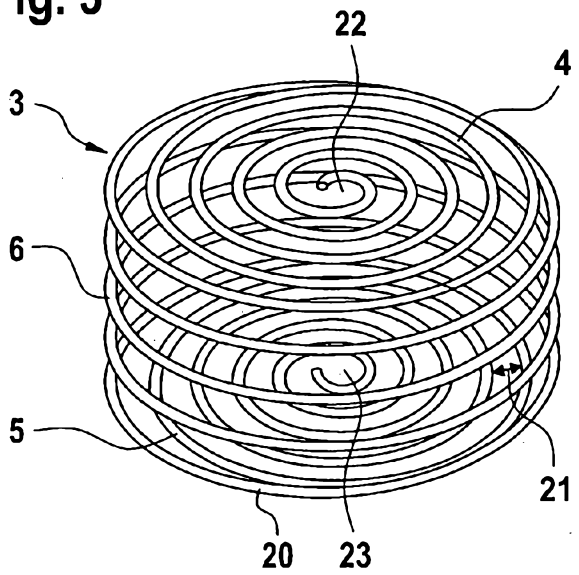

Fig. 5

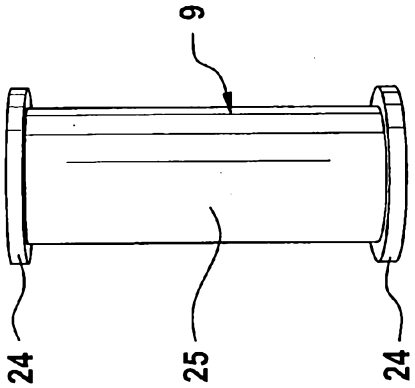

Fig. 4

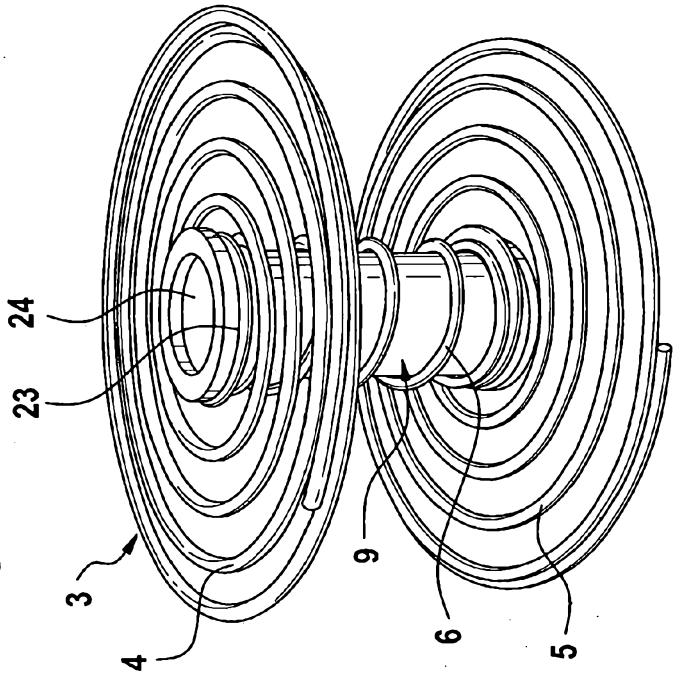

Fig. 6