

## **DEVICE FOR THE ROTATION OF OBJECTS (EMBODIMENTS). SET FOR THE ROTATION OF OBJECTS**

The invention is related to the consumer goods industry; in particular, it's related to containers and rotating supports for different items.

It's known the device for rotating a liquid container, which includes a basement with a central stop lug being made together with an item in whole (See RF Patent No. 52685 of 27. 04. 2006).

A disadvantage of the known device is impossibility of rotating the basement within allowable limits of its swaying; it's especially important for using a glass for liquid. In addition, the value of rotation resistance force depending on the basement diameter and shape is important for rotation.

The technical result being a target of the invention consists in creation of such variants of the device for rotation of items, which exclude possibility of its excessive swaying due to the certain proportions of the basement components, and increase its rotation time.

For the device, the above technical result by the first variant shall be achieved due to the ratio of the basement radius to the central stop lug height being within 40-2000; at that, the basement could be made at least with one lateral lug of lesser height than the central one.

The lateral lugs could be made as bearing ones, and located at the basement lower surface having possibility to interact with cylindrical surface of a restrictor enveloping the basement.

For the device, the technical result by the second variant, which includes a basement with a central stop lug being made together with an item in whole, or with the possibility to fix an item at, shall be achieved due to the basement shall be made at least with one lateral lug of lesser height than the central one. The possible location of the lateral lugs is described above.

The value of ratio of distances between centers of the central stop lug and lateral lugs to the difference between their heights should be within 40-2000.

The lateral lugs could be pointed, curved, straight, or ring-shaped.

The central stop lug and/or lateral lugs could be height-adjustable, for example, as threaded components with flanged bearing surface made from easily machinable material.

In some cases, the basement could be made with adjustable counter-weights, for example, as threaded components.

To create an air film, the lower surface of basement shall be profiled simulating propeller blades and/or forming air ducts.

To slow response, the basement could be made having a massive part and/or equipped at least with one weight, for example, in the shape of ring or as discrete mass.

To create some entertaining effect, the basement should have a cavity where an indicatory element having possibility to move shall be located.

For the device, the technical result by the third variant shall be achieved due to the basement with a central stop lug capable for fixing an item at. Such a basement construction slows its response and increases its generality of usage (increases its scope of application).

For the device, the technical result by the fourth variant, which includes a basement with a central stop lug being made together with an item in whole or with the possibility to fix an item at, shall be achieved due to the stop lug being made ring-shaped, or having the flanged bearing surface, or with separate components being located circumferentially. Such a construction of the basement allows its usage at rough and relatively soft surfaces; as well as it allows keeping the stable upright position without using any lateral support points; at that, ratio of the basement lower surface area and the stop lug flanged bearing surface area, or area being enclosed with components forming the stop lug, shall be 16 – 400.

For the device, the technical result by the fifth variant shall be achieved due to the device for rotation of items includes a basement with a central stop lug being made together with an

item in whole or with the possibility to fix an item at, and having a lower profiled surface where the maximum height of protruding central bearing area is more than height of its peripheral bearing areas.

The lower profiled surface could be made convex or cone with at least one protruding peripheral bearing area, or one lateral lug of lesser height than that of the lower profiled surface central bearing area, or wavy in planes crossing the basement's vertical central axis.

In the invention, by the sixth variant, the technical result shall be achieved due to the device for rotation of items includes a basement with a central stop lug being made together with an item in whole or with the possibility to fix an item at, and having a lower profiled surface forming a protruding central bearing area, and at least one peripheral stop lug; or forming at least one peripheral bearing area and central stop lug; at that, height of the protruding central bearing area shall be more than that of the peripheral stop lug, and height of the central stop lug – more than that of the peripheral bearing area.

To ensure the technical result achievement, the set for rotation of items shall be used, which includes at least one device including a basement with a central stop lug being made together with an item in whole or with the possibility to fix an item at, and one bearing member having a flanged bearing surface for the respective basement, or one bearing member having a flanged bearing surface for at least two basements.

The set for rotation of items could be equipped with a packing having plain surface for bearing the basement at, being made, for example, at its cover.

The nature of inventions has been explained in the drawings.

At Figure 1, a general view of the basement has been shown by the first variant; at Figure 2 - a general view of the basement for rotating items by the second variant; at Figure 3 – ordered arrangement of the lateral lugs; at Figure 4 – other variants of the lugs arrangement; at Figure 5 – the basement with one ringed lug and several curved lugs located circumferentially; at Figure 6 – the same with curved profiled lugs; at Figure 7, the lugs with flanged bearing surface have been

shown; at Figure 8, possible shapes of the basement lower surface have been shown; at Figure 9 - possible shapes of the lugs; at Figure 10, the adjustable lugs have been shown; at Figure 11, the basement with counter-weights has been shown; at Figure 12, the basement with its lower surface in the shape of blades has been shown; at Figure 13, the basement with air intakes has been shown; at Figure 14, the basement with additional weight has been shown; at Figure 15, the variants of the additional weight have been shown; at Figure 16, the central stop lug with bearing area has been shown; at Figure 17, the ringed central stop lug has been shown; at Figure 18, the ringed central stop lug made with the separate members has been shown; at Figure 19, the device's basement with convex lower surface has been shown; at Figure 20 – the device's basement with wavy lower surface; at Figure 21 - the device's basement with cone lower surface; at Figure 22 - the device's basement with central bearing area and peripheral stop lugs; at Figure 23 - the device's basement with peripheral bearing area and central stop lug.

The device for rotation of items includes the basement (1) with the lower surface (2). The lower surface's (2) shape and size are important for rotation of an item (4) at any even horizontal surface (3) about some vertical axis (5). The basement could be an independent item, or be an integral part of some item (4); for example, it could be a bottom of glass, or some bearing member of the support. If the basement is an independent item, the method of fixing the item (4) to the basement shouldn't be essential. The item (4) could be fixed to the basement (1) by any way.

The basement's support point (6) is located at its central stop lug (7); and by the second variant, the basement has also lateral support points (8) at the lateral stop lugs (9).

Shape of a central support point being at a lower part of the lug (7) depends on its shape – semi-sphere, cone, pyramid, rod, needle, etc. The central support point (6) is located at the vertical axis (5) (axis of rotation) passing through the basement's center of balance (10).

The lateral support points (8) (lateral lugs – 9) are located in the distance “a” from the central support point (6). The distance “a” shall be defined by the dimensions of the basement (1) and could be less than diameter of the basement’s (1) lower surface (2).

By the first variant (of all the variants) (Figure 1), the device special feature consists in the ratio of the basement radius (R) to the central stop lug height (H) being within 40-2000; at that, the basement could be made at least with one lateral lug of lesser height than the central one. The above ratio has been obtained by experimental and theoretic way using the bearing surfaces (3) having different grade of finish.

On the second variant, the device construction special feature consists in the special developed shape of the basement’s (1) lower surface (2). The number of lateral support points (lateral lugs) could be three or more. The lateral support points could be orderly located at the lower surface; for example, they could be located at apexes of some equilateral polygon with its center at the central support point, or randomly, or ornamentally.

It’s possible use one ringed lateral lug made with the basement integrally, or screwed on the basement; or one closed profiled lateral lug. The lateral lugs could be made as curved legs being located circumferentially, or in a form of some ornament.

For the best rotating the basement, with the minimum friction between the lateral bearing points and surface (3), location of the lateral bearing points along continuous or dash line circumferentially with the center of circle at the central support point shall be preferred.

The central lug and lateral lugs could be of different shapes in their section – triangle, semicircle, etc.

In this case, contact with the surface (3) would be performed at the separate points decreasing the friction between the bearing points and surface (3). Also, the lugs could have small flat areas (11) at their ends. It could decrease the lugs’ wearing process during their friction with the surface (3) when rotating, and decrease rotating resistance of the rough and respectively soft surface (3).

A purpose of the central support point (6) consists in providing for the basement (1) its capability to rotate about axis of rotation (5). A purpose of the lateral support points consists in providing for the basement its necessary stability in vertical position, avoiding its sideward overturning. The ideal variant could be possible, if the basement (1) being at the horizontal surface (3) could bear on this surface with the only central support point (6). In this case, the basement could rotate about axis of rotation (5) as effectively as possible (with maximum duration). However, as the center of balance (10) is located higher than the support point (6), the basement being supported with one central support point only would be in instable equilibrium. At that, the basement will try to go to the state of stable equilibrium by inclination to any side with supporting by the horizontal surface in addition to the central support point (6), by the lateral support points (8) or the basement's end additionally.

When the basement is in its dominant equilibrium and rotates at the surface (3) about the axis of rotation (5), it is in such a position being supported by the horizontal surface using the central and lateral support points continuously.

The size  $h$  (Figure 2) is important for the basement structure. The size  $h$  defines the height of central lug (7), which includes the central support point, in relation to the lateral support points. Due to this lug, the basement could rotate about the vertical axis (5) at the horizontal surface (3). With value of  $h=0$ , the central support point and lateral support points are in the same plane. At that, rotation of the basement is impossible. If value of  $h$  is too high, the basement should swing a lot (it inclines sideward from the vertical axis (5)). Such a swinging of the basement decreases its time of rotation significantly. Swinging the basement decreases its visual appeal significantly. The optimum value of  $h = 0.05-0.15$  mm. This range of  $h$  shall be recommended for the basement when the size “ $a$ ” (Figure 2) is within 20-100 mm. At that, using the basement at horizontal flat surfaces with insignificant roughness is supposed. Such surfaces could include almost all the widely used surfaces for manufacturing the tablespots, windowsills, furniture. Different hard plastics, wood, artificial and natural stone, etc. could be material for

such a surface. The range of  $h = 0.02-0.05$  mm will be optimum for range of size  $a = 5 - 50$  mm, as well as when the basement is supposed to be used at too smooth surfaces such as glass, polished stone, and similar. A range of  $h = 0.1- 1$  mm is recommended for devices with  $a = 100 - 500$  mm, as well as when the basement is used at too rough or having significant curves (height differences) surfaces. The basements with bigger value of  $h$  are possible when correspondently bigger value of “ $a$ ” is used, as well as for their usage at curved surfaces.

Also, the value of  $h_1$  (Figure 2) is important for the basement structure. The size  $h_1$  defines height of the lateral lugs (9) and distance between the basement lower surface (2) and horizontal surface (3). The lateral lugs (9) are necessary for the following. When there is no lateral lug ( $h_1=0$ ), the basement (1) lower surface (2) is plane (Figure 2). As the recommended value of  $h$  is too small, in a case of the basement flat lower surface, its significant part could come into contact with the surface (3). Conditionally, let's name this part of contacting surfaces as area (X) (Figure 1). When rotating the basement in the area (X), some significant friction between the basement (1) lower surface (2) and surface (3) is appeared. In addition, different foreign fine particles (dust, fine sand, particles of food, etc.) could be present at the surface (3); they also could resist to the basement rotation significantly. To exclude the above factors, which resist to the basement rotation, the application of  $h_1 = h$  and more is recommended, as well as ratios of the above parameters for the first and second variants of the invention. When manufacturing the basement, the maximum value of  $h_1$  shall be defined whether based on esthetic considerations, or technological requirements. Also, the maximum value of  $h_1$  could be defined based on more complicated shape of the lower surface (2) in the cases when such a shape of the lower surface leads to improving the basement rotation.

Based on esthetic considerations, the basement could have more complicated configuration. The central lug (7), lateral lugs (9), and lower surface (2) could be of different shapes (Figure 8).

The central lug (7) and lateral lugs (9) could take a shape of columns, spheres, “legs”, beams, etc. The lower surface (2) takes a shape of bow, arch, and other complicated forms (Figure 9).

The central lug (7) and lateral lugs (9) could be adjustable by height. In this case, the value of  $h$  is adjustable to the necessary value (for example, depending on the basement (1) rotation surface (3) roughness degree). For this purpose, the lugs (7) and (9) could be performed separately from the basement as threaded rods (12) and connected to the basement with threaded connections (Figure 10).

It's very important for the center of balance (10) (Figure 2) to be at the axis of rotation (5), or as close to it as possible. In such a case, the minimum pressure will be put by the lateral support points (8) to the horizontal surface (3). Then, the lateral support points (8) will be subject to the minimum friction with the horizontal surface (3) during rotation of the basement at the horizontal surface.

However, when a shape of combination of the basement and item (4) is complex, and calculation of exact location of the central support point (6) in relation to the axis (5) becomes complicated; the possibility of not coinciding the axis (5) and center of balance (10) exists.

In order to make the center of balance (10) and axis of rotation (5) as close as possible, the basement structure could be equipped with the system of adjustable counter-weights (balancers); and moving the basement's center of balance should be possible by moving them. The counter-weights could be made as components (13) (Figure 11) screwed into using the connecting thread or otherwise.

The basement's lower surface could be made in a shape similar to blades of fan, propeller, and turbine (Figure 12)

During the basement rotation, such blades will generate some lifting force decreasing the pressure of lateral support points to the surface of basement rotation. At that, friction between the

lateral support points and surface (3) will decrease, and duration of the basement rotation – increase.

The lower surface of basement could be made with grooves – air intakes (probably, combining with blades) (Figure 13). During the basement rotation, these grooves – air intakes will generate some concentrated air flows (jets) directed to the lateral support points, by that, creating some air cushion effect between the lateral support points and surface of the basement rotation. Due to that, friction between the lateral support points and surface of the basement rotation will decrease, and duration of the basement rotation – increase.

To increase the duration of basement rotation, its inertia (principle of flywheel) shall be increased. It can be achieved using materials of higher density for the basement manufacturing. It could be achieved using some design solutions – by distribution of significant part of the basement's weight around its lateral peripheral part (on perimeter) uniformly (Figure 14).

If the basement is made from some material of low density, its inertia could be increased significantly by uniform distribution of some additional counter-weights along its lateral peripheral part (perimeter) (Figure 15); such counter-weights could be made as separate units (14) or complete ring (15) from some material of high density.

The central stop lug could have any flanged bearing surface (16) (Figure 16), or be made as a ring (17) (Figure 17), or consist of separate members (18) being located circumferentially (Figure 18); at that, the ratio between the lower surface of basement and area of the stop lug's flanged bearing surface, or area limited by the members of stop lug shall be 16 – 400.

With this design, the basement is only supported by the area (16), when it is in the dominant equilibrium at the horizontal surface, or rotates about the vertical axis of rotation (5), or supported by the area (16) only. It allows the basement's vertical stable position without supporting by the lateral support points (8). Due to that, no friction between the lateral support points (8) and surface (3) is appeared to create any frictional action on the basement rotation.

When using this variant of the basement design, location of the center of balance (10) at the vertical axis of rotation (5) being located within the area (15), or ring (17), or ring consisting of the members (18) is very important.

Any additional improving the basement by the second variant of the invention shall be related to all its variants.

Application of the device.

As above indicated, this device shall be applied in combination with the item (4) whether as integral whole, or as independent item for fixing the item (4) at.

The variant of integral execution of the basement with the item could be applied when the item as integral whole with the basement is manufactured by the following way: 1 - mold casting (plastic, polymers, glass, crystal, ceramics, metal). 2 – mold pressing (press forming) (plastic, polymers, glass, metal), 3 – machining process (plastic, polymers, glass, crystal, ceramics, metal, artificial and natural stone, wood).

The generality of application is a special feature of the variant for making the basement separately. However, in this case, the additional complicacy appears due to the necessity of some mechanism for fixing an item at the device.

The basement (1) with some profiled surface forming the central protruding bearing area (19), or central lug (20) with central support point (6) and lateral support points (8) at the lateral stop lugs (9) or peripheral bearing areas (parts) (21) being formed by the profiled surface are special features of the fifth and sixth invention variants.

A shape of the central support point (6) could be spherical, or cone. The central support point (6) shall be located at the vertical axis (5) passing through the basement's center of balance (10).

The lateral support points (8) (lateral stop lugs (9) or peripheral bearing areas (parts) (21)) are located in the distance "a" from the central support point (6). The distance "a" shall be

defined by dimensions of the basement (1) and could be less than the basement's (1) lower surface (2) diameter.

The above parameters  $h$  and  $h_1$  could be applied to the peripheral bearing area (21) and to the central protruding bearing area (19) (Figure 19 – 23) as well.

Independent of the variant of execution, the item being at the basement could be correspondent to many different applications. It could be some hollow container or box:

- any container for keeping any small items (casket, plastic cup for pencils, container for bulk stock, ash tray, plate....)
- container (vessel) liquids (glass (wineglass), vase, shaker, chemical utensils....)

It could be some monolithic item:

- any interior decoration (sculpture, candlestick, candelabrum....)
- reward decoration (pennon, goblet, obelisk.....)

It could be some complex structure

- some appliance for outdoor advertising (display, support (pedestal) for demonstration of the advertised goods in a shop or at an exhibition....)

Also, the device could be a playing component. For this purpose, the basement should be hollow; and within its cavity, some indicatory member being capable to move shall be located, for example, a ball. When rotating the basement, independent moving of the indicatory member is performed; and having stopped, the indicatory member indicates the winner or looser.

Not all the bearing surfaces, for example, a table covered with an oilcloth, could provide the necessary degree of rotation. To provide the guaranteed basement rotation at any bearing surface, one could use the set for rotation of items including at least one basement with the central stop lug being made as integrate whole with an item, or with the possibility to fix an item at, and separate bearing member with flanged bearing surface for the correspondent basement, or one bearing member with flanged bearing surface for at least two basements.

Thus, the set could include several basements and respective number of the bearing members with flanged bearing surface, or one general bearing member, for example, tray.

As a bearing member, the cover of container for packing the device could be used.

### **Claims.**

1. The device for rotation of items including a basement with the central stop lug made as integral whole with an item, or with the possibility to fix an item at, being different due to the ratio of the basement's radius to height of the central stop lug shall be within 40-2000.

2. The device per i.1 being different due to the basement shall be made at least with one lateral lug of lesser height than the central one,

3. The device for rotation of items including a basement with the central stop lug made as integral whole with an item, or with the possibility to fix an item at, being different due to the basement shall be made at least with one lateral lug of lesser height than the central one.

4. The device per i.3 being different due to the ratio of the distance between centers of the central stop lug and lateral lugs to the difference between these lugs' heights shall be within 40-2000.

5. The device per i.3 being different due to the lateral lugs shall be pointed.

6. The device per i.3 being different due to the lateral lugs shall be straight or curved sections.

7. The device per i.3 being different due to the lateral lug shall be ringed.

8. The device of any type per i. 3 - 7 being different due to the central stop lug and/or lateral lugs shall be made adjustable by height.

9. The device per i.8 being different due to the lugs shall be made as threaded members.

10. The device of any type per i. 3 – 7, 9 being different due to the lugs shall be made from some from easily machinable material.

11. The device of any type per i. 3 – 7, 9 being different due to that at least one of lugs shall be made with some flanged bearing surface.

12. The device of any type per i. 3 – 7, 9 being different due to the basement shall be made with adjustable counter-weights.

13. The device per i.12 being different due to the counter-weights shall be made as threaded members.

14. The device of any type per i. 3 – 7, 9, 13 being different due to the lower surface of basement shall be profiled and simulating the air propeller blades and/or forming the air ducts.

15. The device of any type per i. 3 – 7, 9, 13 being different due to the basement shall be made with some massive part and/or equipped at least with one weight.

16. The device per i.15 being different due to the weight shall be made in the shape of ring or as discrete mass.

17. The device of any type per i. 3 – 7, 9, 13 being different due to the basement shall be made with a cavity where an indicatory element having possibility to move shall be located.

18. The device for rotation of items including a basement with the central stop lug made with the possibility to fix an item at.

19. The device for rotation of items including a basement with the central stop lug made as integral whole with an item or with the possibility to fix an item at, being different due to the stop lug shall be made with the flanged bearing surface, or ringed, or it shall be formed by separate members being located circumferentially.

20. The device per i.19 being different due to the ratio of the lower surface of basement to the flanged bearing surface of stop lug, or to area closed by members forming the stop lug shall be 16 – 400.

21. The device for rotation of items including a basement made as integral whole with an item, or with the possibility to fix an item at, and with the lower profiled surface with maximum height of the protruding central stop lug being more than that of its peripheral bearing area.

22. The device for rotation of items per i. 21 being different due to the lower profiled surface shall be made convex forming at least one peripheral protruding bearing area of height lesser than maximum height of the protruding central bearing area of the lower profiled surface.

23. The device for rotation of items per i. 21 being different due to the lower profiled surface shall be made wavy in planes crossing the vertical central axis of basement.

24. The device for rotation of items per i. 21 being different due to the lower profiled surface shall be made cone.

25. The device for rotation of items including the basement made as integral whole with an item, or with the possibility to fix an item at, and with the lower profiled surface forming some protruding central bearing area and at least one peripheral stop lug, or forming at least one peripheral bearing area and central stop lug; at that, height of the protruding central bearing area shall be more than that of the peripheral stop lug, and height of the central stop lug – more than that of the peripheral bearing area.

26. The set for rotation of items including at least one device being the basement with the central stop lug being made as integrate whole with an item, or with the possibility to fix an item at, and some separate bearing member with flanged bearing surface for the correspondent basement, or one bearing member with flanged bearing surface for at least two basements.

27. The set for rotation of items per i. 26 being different due to its equipment by the packing having the flat surface for bearing the basement.

28. The set for rotation of items per i. 27 being different due to the above surface shall be made at the cover.