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(54) **TOP TOY SET AND TOP TOY**

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(57) **ABSTRACT**

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A top toy being is provided. The top toy is used together with a field including a step part and an acceleration rail being configured on the step part. The top toy includes a rotating shaft extending in an axial direction, a rotor being concentric with the rotating shaft, and a ride-over part being configured on the rotating shaft above the rotor. The rotating shaft includes a landing part on a bottom end thereof. The rotor is configured to engage with the acceleration rail. The ride-over part includes an axially symmetrical sliding contact surface. The sliding contact surface has a diameter increasing as extending upwardly in the axial direction.

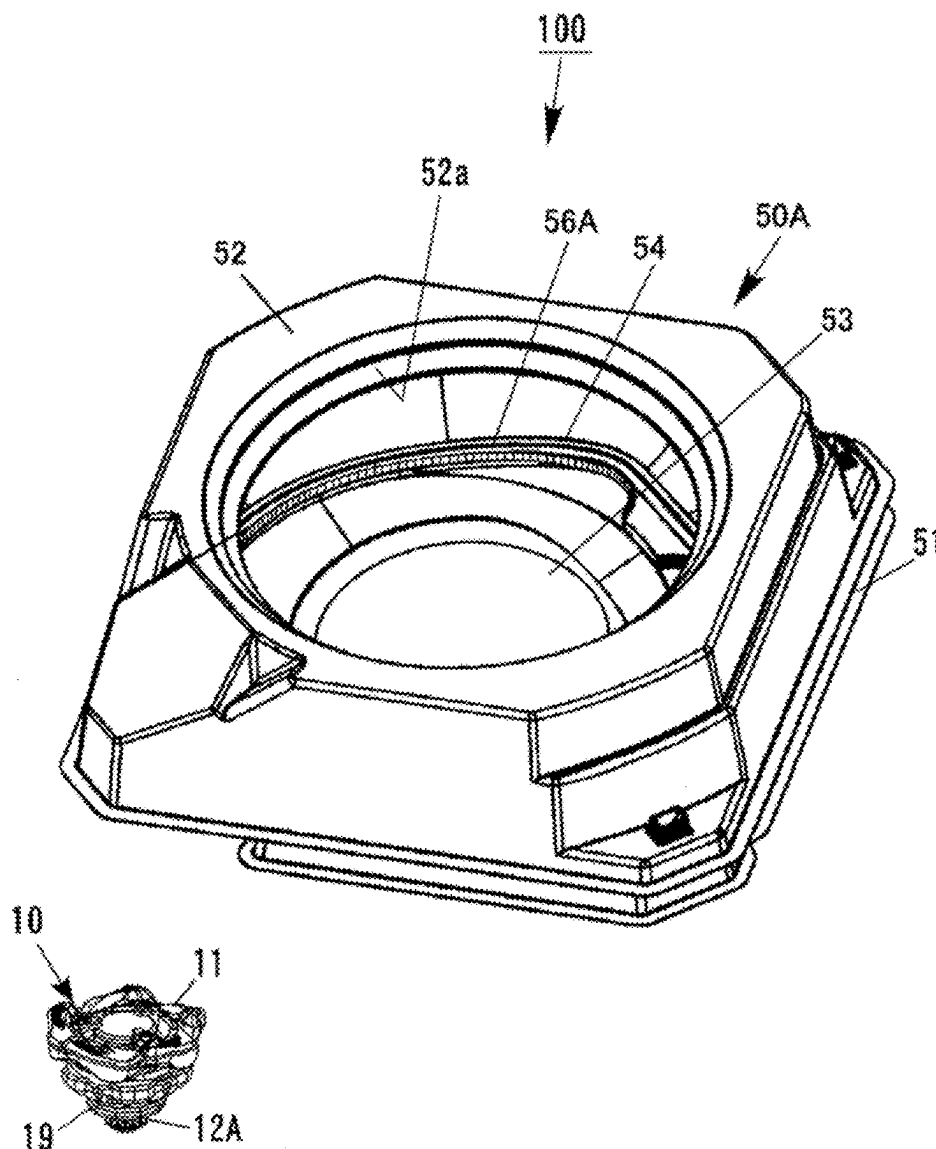


FIG. 1

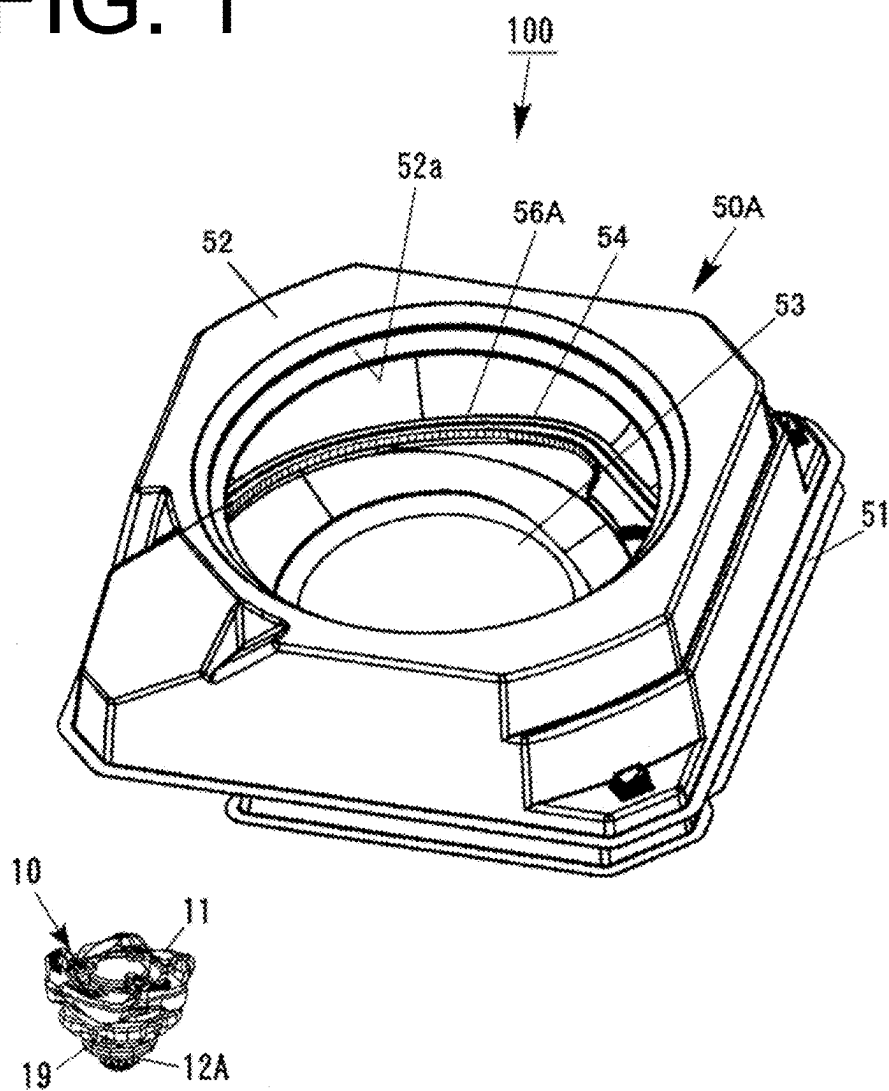


FIG. 2

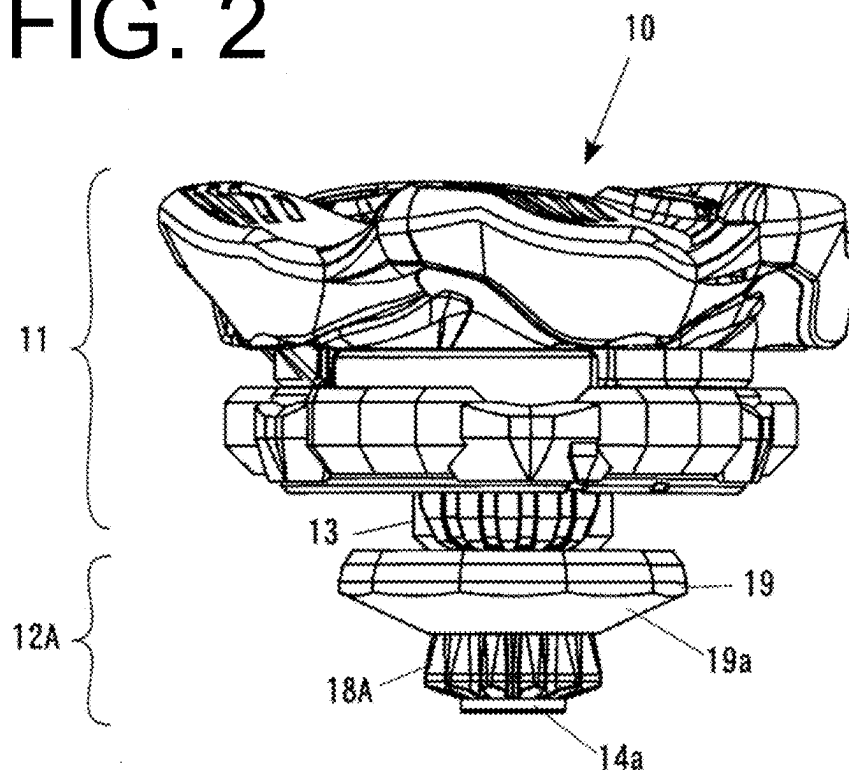


FIG. 3

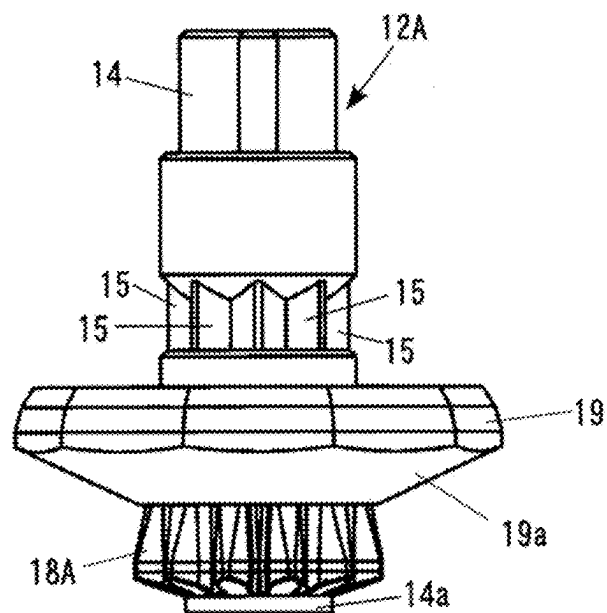


FIG. 4

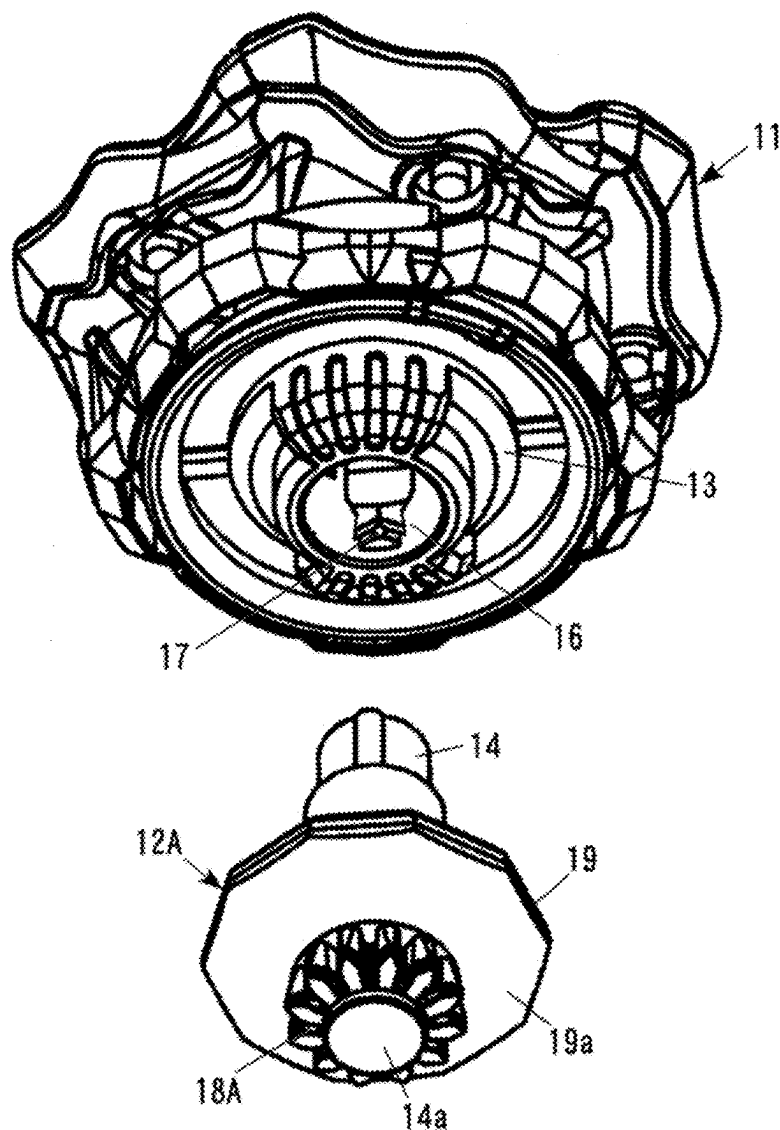


FIG. 5A

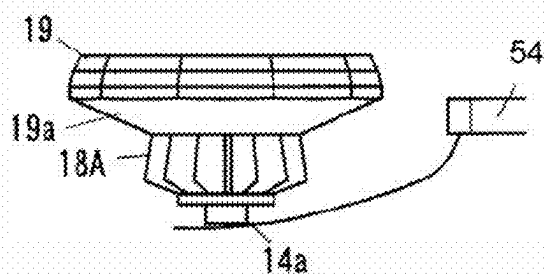


FIG. 5B

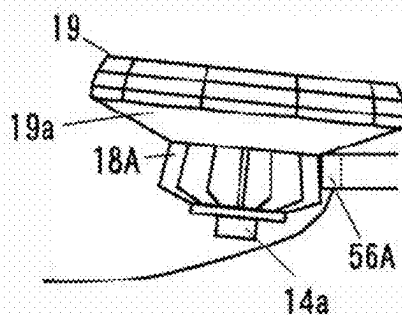


FIG. 5C

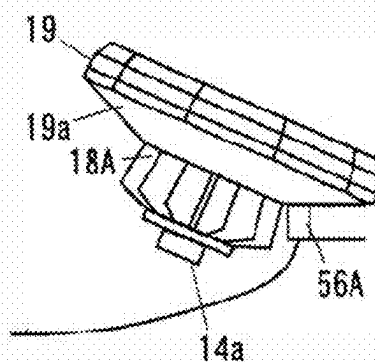


FIG. 6A

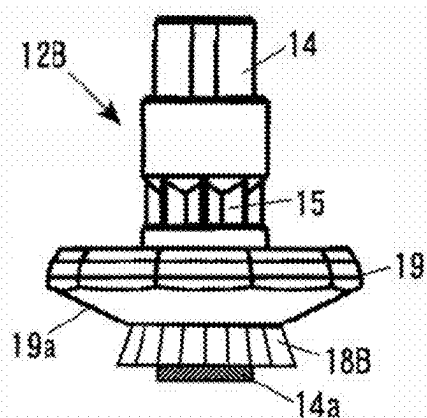


FIG. 6B

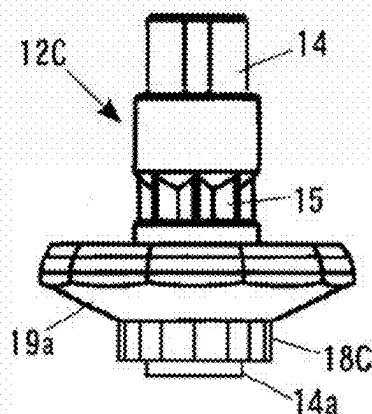
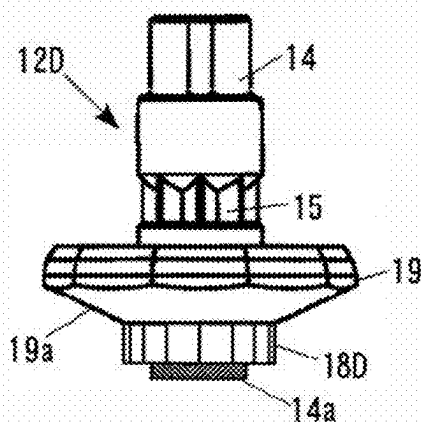


FIG. 6C



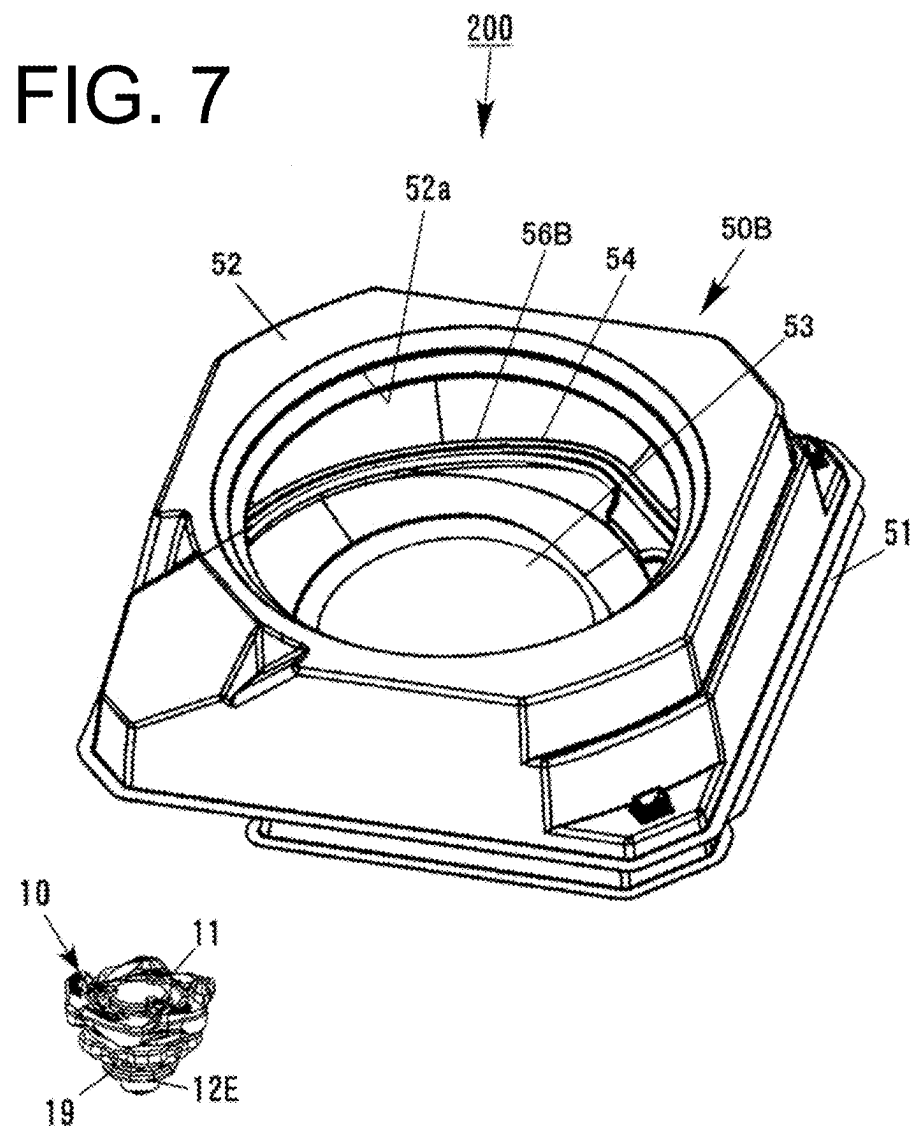
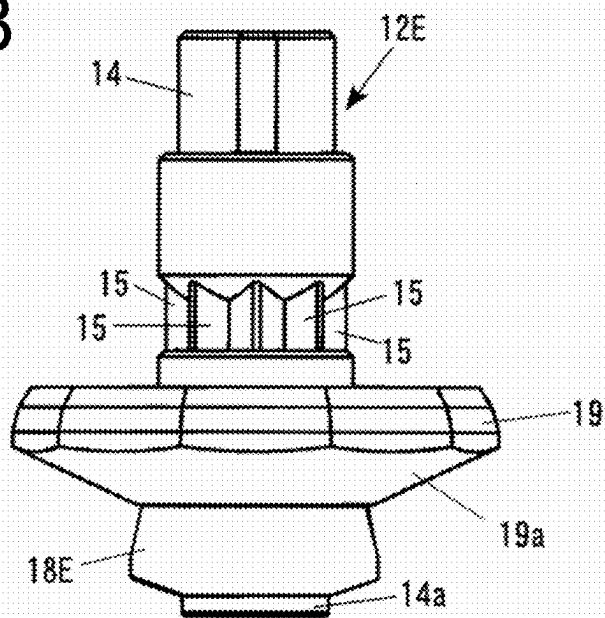


FIG. 8





## TOP TOY SET AND TOP TOY

### CROSS-REFERENCE TO THE RELATED APPLICATION

[0001] The present application claims priority under 35 U.S.C. 119 to Japanese Patent Application No. 2024-024000 filed on Feb. 20, 2024. The entire content of Japanese Patent Application No. 2024-024000 is incorporated herein by reference.

### BACKGROUND

#### Technical Field

[0002] The present invention relates to a top toy set and a top toy.

#### Background Art

[0003] Known from the past are a top toy set comprising: a top toy with a gear provided on a rotating shaft; and a stadium that, in a field in which the top toy is rotationally energized and released, has a rack that meshes (engages) with the gear and accelerates the top toy (Patent Document 1).

PRIOR ART DOCUMENTS Patent Document 1:  
Patent Publication No. 7349003

### SUMMARY

#### Problems the Invention Is Intended to Solve

[0004] However, according to this top toy of the above-mentioned top toy set, the movement of the top toy was monotonous because the gear meshed with the rack while the top toy remained landed. Specifically, when the top toy contacted the rack, it either bounced back, or was accelerated the moment it contacted the rack. Taking such circumstances into consideration, the purpose of the present invention is to provide a top toy set and a top toy that can make the top toy do innovative movements.

#### Means for Solving the Problems

[0005] A top toy being is provided. The top toy is used together with a field including a step part and an acceleration rail being configured on the step part. The top toy includes a rotating shaft extending in an axial direction, a rotor being concentric with the rotating shaft, and a ride-over part being configured on the rotating shaft above the rotor. The rotating shaft includes a landing part on a bottom end thereof. The rotor is configured to engage with the acceleration rail. The ride-over part includes an axially symmetrical sliding contact surface. The sliding contact surface has a diameter increasing as extending upwardly in the axial direction.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a perspective view of a top toy set according to a first embodiment.

[0007] FIG. 2 is a front view of a top toy according to the first embodiment.

[0008] FIG. 3 is a front view of a shaft part of the top toy according to the first embodiment.

[0009] FIG. 4 is a perspective view showing the mounting structure of the shaft part.

[0010] FIGS. 5A-5C are drawings for explaining how the shaft part works.

[0011] FIGS. 6A-6C are front views showing a modification example of the shaft part.

[0012] FIG. 7 is a perspective view of the top toy set according to the first embodiment.

[0013] FIG. 8 is a front view of the shaft part of the top toy according to a second embodiment.

### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0014] Hereafter, a top toy set and a top toy according to embodiments of the present invention are explained based on the drawings.

#### First Embodiment

[0015] FIG. 1 is a perspective view of a top toy set 100. [0016] This top toy set 100 comprises a top toy 10, and a stadium (field) 50A for having top toys 10 battle each other.

#### Top Toy 10

[0017] FIG. 2 is a front view of the top toy 10. The top toy 10 is constituted mostly from plastic.

[0018] The top toy 10 comprises a trunk part 11 and a shaft part 12A. The trunk part 11 is a composite part. Recesses and projections are formed all around the outer periphery of the trunk part 11. The attack performance and defense performance change during battle according to the shape of these recesses and projections.

[0019] A mounting unit 13 is provided on the bottom end of the trunk part 11. The shaft part 12A is detachably mounted on the mounting unit 13.

[0020] FIG. 3 is a front view of the shaft part 12A. This shaft part 12A is provided with a rotating shaft 14. The bottom end of the rotating shaft 14 constitutes a landing part 14a.

[0021] Engaging recesses 15 are formed at prescribed intervals along the entire circumference direction area of the rotating shaft 14 on the outer periphery of the center part in the vertical direction of the rotating shaft 14. Meanwhile, as shown in FIG. 4, a hole 16 for insertion of the rotating shaft 14 is formed on the mounting unit 13. Inside the hole 16, provided are elastic claws 17 for engaging with the engaging recesses 15. Two elastic claws 17 are provided sandwiching the center axis of the hole 16. By engaging the elastic claws 17 and the engaging recesses 15, the shaft part 12A is mounted on the mounting unit 13. When the shaft part 12A is mounted in the mounting unit 13, the top end of a ride-over part 19 described later is abutted on the bottom end of the mounting unit 13. By this abutting, the shaft part 12A is held stably on the trunk part 11. The shaft part 12A rotates integrally with the trunk part 11. The shaft part 12A can be removed from the trunk part 11 by manually pulling downward with respect to the trunk part 11.

[0022] A gear 18A is provided directly above the landing part 14a of the rotating shaft 14. The center line of the rotating shaft 14 and the center line of the gear 18A are aligned. The gear 18A is a gear that is tapered so that the diameter becomes larger as it goes downward.

[0023] The ride-over part 19 that protrudes in a flange shape is provided directly above the gear 18A of the rotating shaft 14 and below the engaging recesses 15. The bottom surface of the ride-over part 19 is an axially symmetrical

sliding contact surface **19a** in which the bottom end has the same shape as the top end circumscribed circle of the gear **18A** and in which the diameter increases as it goes upward in the axial direction.

#### Stadium (Field) **50A**

**[0024]** The stadium **50A** shown in FIG. **1** is constituted to be transparent using polyvinylchloride.

**[0025]** The stadium **50A** constitutes a field for doing top battles, and comprises a base plate **51**, and a cover body **52** provided on the base plate **51** and having a circular opening **52a** on the ceiling. The center of the field floor surface forms a grinding bowl shaped recess **53**. Also, a cant (slope) on which the top toy **10** runs around is formed on the perimeter of the recess **53**. A step part **54** is formed on the outside of this cant. The field is divided into a lower level and an upper level with this step part **54** as the boundary. The upper part of the step part **54** is constituted from an acceleration rail **55**. The acceleration rail is constituted from a rack **56A** that can mesh (engage) with the gear **18A**. The rack **56A** constitutes a portion of the step part **54** and constitutes a portion of the upper level.

#### Relationship Between Shaft Part **12A** and Rack **56A**

**[0026]** When the rack **56A** and the gear **18A** mesh, the landing part **14a** of the rotating shaft **14** is constituted to separate from the floor of the lower level. That is, this top toy set **100** is configured so that when the top toy **10** that is running around the lower level abuts the step part **54**, first, the sliding contact surface **19a** of the ride-over part **19** abuts the top corner of the step part **54**. By the sliding contact of the sliding contact surface **19a** and the step part **54**, when the ride-over part **19** rides on the step part **54**, the landing part **14a** of the rotating shaft **14** separates from the lower level floor, and the gear **18A** meshes with the rack **56A**.

**[0027]** Said another way, when the landing part **14a** of the rotating shaft **14** does not separate from the lower level floor, the gear **18A** does not mesh with the rack **56A**.

#### Rotational Energization of Top Toy **10**

**[0028]** The top toy **10** is mounted on a shooting device (not illustrated). At that time, for example, the convex part of the output rotor of the shooting device is engaged with an arc-shaped recess formed on the top surface of the top toy **10**, and by rotating the output rotor, the top toy **10** is rotationally energized, after which the output rotor is stopped. As a result, engagement of the arc-shaped recess and the convex part is released, and the top toy **10** is shot. Alternatively, the top toy **10** is held by a chuck of the shooting device and rotationally energized, and the top toy **10** is shot by releasing the hold by the chuck.

#### Movement of Top Toy **10**

**[0029]** As shown in FIG. **5A**, in the top toy **10** running around the lower level, the sliding contact surface **19a** of the ride-over part **19** abuts the top corner of the step part **54**. In this case, if the abutting force is weak, the gear **18A** and the rack **56A** are left unmeshed, and the top toy **10** separates from the step part **54**.

**[0030]** Meanwhile, when the abutting force between the sliding contact surface **19a** of the ride-over part **19** and the top corner of the step part **54** is strong, as shown in FIG. **5B**, there is sliding contact between the sliding contact surface

**19a** and the top corner of the step part **54**, and the ride-over part **19** rides on the step part **54**. As a result, the landing part **14a** of the rotating shaft **14** floats up from lower level floor, and the gear **18A** meshes with the rack **56A**. As a result, by rotation of the gear **18A**, the gear **18A** rolls while meshing with the rack **56A**, and the movement of the top toy **10** is accelerated.

**[0031]** For example, at a location where the gear **18A** is meshing and rolling and the rack **56A** is in a sharp curve, a strong centrifugal force works on the top toy **10**. In this case, as shown in FIG. **5C**, the center line of the top toy **10** significantly inclines to the step part **54** side, and there are cases when meshing of the gear **18A** and the rack **56A** is disengaged, in which case there is also an effect of the shaft tip being short, and the entire top toy **10** rides on the upper level with the momentum of the centrifugal force/acceleration as is. The top toy **10** which has ridden on the upper level returns to the lower level after running on the upper level floor. Alternatively, there are also cases when at the timing of returning to the lower level, the gear **18A** and the rack **56A** mesh again and the top toy **10** accelerates.

#### Effect of the Embodiment

**[0032]** It is possible to obtain the following kind of effects according to the top toy set **100** configured in this way.

**[0033]** First, when the top toy **10** contacts the step part **54**, it moves around with the landing part **14a** of the rotating shaft **14** still floating up from the lower level floor, so there is an element of surprise, making it possible to realize a top toy set **100** that is highly entertaining.

**[0034]** Second, after abutting of the top toy **10** and the step part **54**, the gear **18A** and the rack **56A** mesh and are rapidly accelerated, so it is possible to realize a top toy set **100** that is highly entertaining.

#### Modification Example of Shaft Part **12A**

**[0035]** FIGS. **6A** to **6C** are front views of modification examples of the shaft part **12A**. In shaft parts **12B** to **12D**, the same code numbers are given to parts in common with the shaft part **12A**, and explanation of those are omitted. A common code number is used for the landing part **14a** of the rotating shaft **14**.

**[0036]** In the shaft part **12B** shown in FIG. **6A**, the landing part **14a** of the rotating shaft **14** is made of rubber which has a greater friction coefficient than plastic. A gear **18B** is the same as the gear **18A**. According to this shaft part **12B**, the top toy **10** runs around more easily by rotation (autorotation) of the top toy **10**.

**[0037]** When rubber is used for the landing part **14a**, when the rubber landing part **14a** lands on the lower level floor, during acceleration, the landing part **14a** rubs against the lower level floor, so this leads to great resistance which makes acceleration difficult. In this regard, as in the embodiment, if the landing part **14a** is floated up from the lower level floor when accelerating, acceleration becomes easier.

**[0038]** In a shaft part **12C** shown in FIG. **6B**, a gear **18C** is a cylindrical gear. According to this shaft part **12C**, the sliding contact surface **19a** of the ride-over part **19** and the upper level floor of the step part **54** abut and are in sliding contact. In this case as well, when the gear **18C** and the rack **56A** have meshed, the gear **18C** rolls with respect to the rack **56A** and the top toy **10** is accelerated. However, when the gear **18C** and the rack **56A** do not mesh, or when meshing

of the gear 18C and the rack 56A is incomplete, by sliding contact of the sliding contact surface 19a of the ride-over part 19 and the upper level floor of the step part 54, it is easier for the top toy 10 to ride onto the upper level floor. In the case of the gear 18C, compared to the case of the gear 18A, it is difficult for the gear 18C and the rack 56A to mesh, and it is easier for the top toy 10 to ride onto the upper level floor.

[0039] In the shaft part 12D shown in FIG. 6C, a gear 18D is a cylindrical gear, and the landing part 14a of the rotating shaft 14 is made of rubber which has a greater friction coefficient than plastic. According to this shaft part 12D, the top toy 10 runs around more easily by rotation (autorotation) of the top toy 10. The landing part 14a is floated up from the lower level floor during acceleration, so it is possible to reduce energy loss.

#### Second Embodiment

[0040] FIG. 7 is a perspective view of a top toy set 200 of a second embodiment. In the top toy set 200, the same code numbers are given to parts having the same configuration as that of the top toy set 100, and an explanation of these is omitted.

[0041] The point of difference between the top toy set 200 of the second embodiment from the top toy set 100 of the first embodiment is that the shaft part is different, and the acceleration rail of the stadium is different.

[0042] As shown in FIG. 8, a shaft part 12E of the top toy 10 is provided with a roller 18E instead of a gear as the rotor. The roller 18E is a roller that is tapered to have a larger diameter as it goes downward. The acceleration rail of a stadium 50B has a smooth surface and is a rail 56B that can abut (engage) with the roller 18E.

[0043] According to this top toy set 200, it is possible to obtain the same effects as with the top toy set 100.

[0044] The shape of the roller 18E can be made to be a cylindrical shape, and the landing part 14a of the rotating shaft 14 can be rubber.

#### Other Modification Examples

[0045] Above, we explained the top toy set 100 according to embodiments of the present invention, but the present invention is not limited to these embodiments and modification examples.

[0046] For example, with the abovementioned embodiments, the shaft part was detachable with respect to the trunk part, but the shaft part may also be fixed to the trunk part.

[0047] In the abovementioned embodiments, the ride-over part was provided on the shaft part, but the ride-over part may also be provided on the trunk part. The ride-over part may also be a separate body from the shaft part or the trunk part. Furthermore, the ride-over part may also freely rotate with respect to the rotating shaft.

[0048] In the abovementioned embodiments, modification examples of the shaft part were cited, but it is also possible to have the shaft parts be replaceable.

[0049] In the abovementioned embodiments, the diameter of the ride-over part is approximately 2 times that of the rotor (gear or roller), but it is sufficient to have the ride-over part have the diameter of the expansion part be greater than the top end part of the roller. Furthermore, it is possible to

make a difference in the ease of meshing by the slope of the sliding contact surface and the size of the diameter. For example, when the slope of the sliding contact surface is steep, the rotation force of the top toy 10 is high, and riding on only occurs when the centrifugal force acts strongly. Meanwhile, when the slope is gentle riding on is easy, but when the diameter is large, rotation force/centrifugal force is required to continue riding until the rotor reaches the acceleration rail.

#### Effect

[0050] According to the aforementioned embodiments, it is possible to make a top toy do innovative movements.

What is claimed is:

1. A top toy set, comprising:
  - a field including a step part and an acceleration rail being configured on a step part; and
  - a top toy including a rotating shaft extending in an axial direction, a rotor being concentric with the rotating shaft, and a ride-over part being configured on the rotating shaft above the rotor, the rotating shaft including a landing part on a bottom end thereof, the rotor being configured to engage with the acceleration rail, the ride-over part including an axially symmetrical sliding contact surface, the sliding contact surface having a diameter increasing as extending upwardly in the axial direction.
2. A top toy being used together with a field including a step part and an acceleration rail being configured on the step part, the top toy comprising:
  - a rotating shaft extending in an axial direction;
  - a rotor being concentric with the rotating shaft; and
  - a ride-over part being configured on the rotating shaft above the rotor, the rotating shaft including a landing part on a bottom end thereof, the rotor being configured to engage with the acceleration rail, the ride-over part including an axially symmetrical sliding contact surface, the sliding contact surface having a diameter increasing as extending upwardly in the axial direction.
3. The top toy according to claim 2, wherein when the top toy stands upright and when the rotor and the acceleration rail are engaged, a first length from a point where the rotating shaft abuts a floor to a top end of the step part is greater than a second length from a bottom end of the landing part to a bottom end of the ride-over part.
4. The top toy according to claim 2, wherein the rotor is a gear, and the guide rail is a rack.
5. The top toy according to claim 4, wherein the gear is tapered with a diameter expanding facing downward.
6. The top toy according to claim 2, wherein the rotor is a roller, and a surface of the acceleration rail is smooth surface.
7. The top toy according to claim 6, characterized in that the gear is a roller that is tapered with the diameter expanding as extending downward.
8. The top toy according to any of claim 2, wherein the landing part is made of rubber.

\* \* \* \* \*