ABSTRACT: A toy for use in water and on solid surfaces having a casing formed in the shape of some amphibious animal, and a working unit removably installed therein. The casing includes a pair of rudders, shaped for instance like the wings of a penguin, and a water tank which, when containing water, enables the toy to swim underwater. The working unit contains a switch mechanism, which can be operated by means of a lever extending through the casing, electric cells, a motor, transmission gears and the like. The motor rotation is conveyed to a pair of flat-shaped foot members through gearing and shafting. These foot members can be slid along the arched bottom of the working unit and fixed at different positions, so that the toy is capable of making variety of motions in water besides walking on solid surfaces.
AN AMPHIBIAN TOY

This invention relates generally to toys, and more particularly to self-moving toys which represent, both in appearance and in some manners of action, penguins, ducks and other more or less amphibious animals.

SUMMARY OF THE INVENTION

The present invention provides a toy having a casing formed in the shape of an animal, and a watertight working unit removably installed in the casing and having a semicircularly shaped bottom on which are formed a plurality of ridges at constant circumferential intervals. A motor is installed in the working unit together with electric cells. A drive shaft is geared to the motor and projects out of both sides of the working unit near the bottom thereof. A pair of crankshafts are coupled to the drive shaft at both ends thereof. A pair of plate members are pivoted by the drive shaft and have a shaft connected therewith. The shaft is revolvable around the drive shaft in agreement with the arched bottom of the working unit and is fixedly stopped at any circumferential position thereof by means of the ridges. A pair of flat foot members through which a pin runs through the shaft are loosely inserted and are moved by means of the crankshafts.

The present invention provides a toy of infinite amusement, designed especially for the playtime use of children.

The invention provides a toy capable of moving both in water and on solid surfaces.

The invention provides a toy in the shape of a penguin and the like, complete with webbed feet by means of which it is capable of both swimming in water and walking on solid surfaces.

An object of the invention is to provide a toy whose webbed feet can be set at such angles that it is capable of swimming with its head either above or below the water surface.

The invention provides a toy having a built-in water tank so that it is capable of swimming submerged at different depths according to the amount of water contained therein.

A further object of the invention is to provide a toy having a pair of rudders, shaped for instance like the wings of a penguin, whereby it is capable of swimming in any desired direction.

The invention provides a toy consisting essentially of a casing formed in the shape of a penguin and the like, and an integral working unit installed therein.

A further object of the invention is to provide a toy wherein the working unit contains a switch mechanism, electric cells, a motor, transmission gears and the like and is easily removable from the casing for replacement of the cells and other purposes.

The invention provides a toy wherein the switch mechanism has an elongated lever extending from the working unit through the casing, so that the switch mechanism is operable from outside by means of that lever.

A still further object of the invention is to provide a toy which requires comparatively simple manipulations to realize all the above described movements, activities or functions.

In one embodiment, the toy of the present invention consists essentially of a casing, formed in the shape of a penguin and the like, and a working unit installed therein. The casing is provided with a water tank on its inside surface, the water tank having a plughole through which water is poured into it and is discharged therefrom. The working unit, shaped so as to be installed in the casing, includes a detachable head portion containing a switch mechanism, an intermediate portion containing electric cells and a motor, and a lower portion containing transmission gears and the like. A pair of flat foot members, shaped for instance like the webbed feet of aquatic birds, are connected to the lower portion. Each of these foot members has its heel-side end loosely engaged with a crankshaft coupled to the drive shaft extending through the lower portion of the working unit, and the both foot members are pivoted in the middle by one and the same pin, hence, with the turns of the crankshafts, the foot members swing to and fro on the other side of the pin. This pin, extending outside the working unit across the arched bottom thereof, is shiftable along the arched bottom so that the foot members can be set at different angles with respect to the toy body proper.

The motor built in the working unit can be set in rotation by means of a switch lever extending out of the casing from the head of the unit, whereupon the foot members exposed from below the casing will start moving in a fluttering manner like those of the penguin.

In water, the toy swims on the surface when the water tank is vacant and when the foot members are set substantially in parallel with the water surface. As water is poured into the tank, and when the foot members are set differently, the toy will submerge head foremost. It is also possible to let it swim with its bottom up, by setting the foot members substantially at right angles with the water surface. Naturally, the swimming speed of the toy varies depending upon the angles at which the foot members are set.

Further, in such use of the toy in water, the aforesaid rudders may be turned by hand, thereby causing the toy to change its course or to turn around because of the varied resistances offered to the water by the rudders.

There are still further interesting performances to be made by the toy of the present invention, if one makes use of the mentioned water tank built in it. The toy is so designed as to float only half immersed in water when the tank is vacant, and to submerge deeper along with increase in the amount of water contained therein. The depth of the submergence can thus be determined in accordance with the amount of water poured into the tank. The combined utilization of this water tank and the above described rudders will enable the toy to gradually submerge itself from the surface or to come floating up from deep down in water. These performances or movements will become more complex and interesting when further combined with those obtained by the above explained adjustment of the foot members at different angles.

For use of the present toy on solid surfaces, its feet may be set flat thereon while the toy itself is kept standing upright. It will then make a walk like that of a penguin, in tottering steps.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a toy constructed in accordance with a preferred embodiment of the present invention.

FIG. 2 is a vertical sectional view of the casing of the toy of FIG. 1, in which the dote and dashes indicate the working unit of the toy.

FIG. 3 is a cross-sectional view of the same toy taken along the plane of line X—X in FIG. 2.

FIG. 4 is a perspective view of the working unit with all its attachments.

FIG. 5 is a partially broken away side elevational view of the same working unit.

FIG. 6 is a fragmentary sectional view of the same working unit taken along the plane of line Y—Y in FIG. 5.

FIG. 7 is a fragmentary front elevational view of the same working unit corresponding to FIG. 6.

FIG. 8A is a side elevational view of FIG. 7.

FIG. 8B is a corresponding side elevational view showing another example of the arched bottom of the working unit.

FIGS. 9C, 9D, 9E and 9F are all explanatory views showing the performances of the toy in water: it swims on the surface in FIG. 9C; swims with its head down in water due to the changed angle of the foot members in FIG. 9D; is submerged completely due to the presence of water in its tank in FIG. 9E; and has its winglike rudders set at different angles for change in direction in FIG. 9F.
DETAILED DESCRIPTION OF SOME PREFERRED EMBODIMENTS OF THE INVENTION

Referring to the drawings, FIG. 1 shows in perspective the entire appearance of the toy of the present invention, shown here in the shape of a penguin by way of example. The toy can be shaped like many other animals, such as ducks and other aquatic birds having webbed feet, which are familiar to children.

Most broadly, the toy consists of a casing and a working unit installed in it.

With reference to FIGS. 2 and 3, the casing 10 of molded plastic has a hole 11 opened at its foremost end which is shaped like the bill of the penguin. The bottom of the casing 10 is wide open. Inside the casing 10, a water tank 13 is formed at the back by partition means 12, and the water tank 13 has a port 14 opened through the back of the casing 10. The port 14 is detachably attached with a plug 15. This plug 15 can be of any type, but in this particular embodiment of the invention, it is always energized outwardly by means of a spring 16, so that the port 14 will open upon depression of the plug 15. Also inside the casing 10, two pairs of ribs 17 and 17', 18 and 18' are formed longitudinally on its front and back sides, among which the working unit still to be described is to be installed. Hence, the intervals between the ribs 17 and 17' and between the ribs 18 and 18' have to be determined in accordance with the size of the working unit. There is provided an engaging projection 19 at the front lowermost edge of the casing 10 and between the extensions of the ribs 17 and 17', thereby to immovably hold the working unit by engaging a projection formed at the front lowermost edge thereof. Rudders 20 and 21 are located at the center of the incomplete circle formed by the ribs 17 and 18, and the projections 20 and 21 are turned by hand, it is necessary that they be pivoted somewhat securely since they have to offer constant resistances to the water as the toy propels itself therein.

The entire working unit 22 is illustrated in perspective in FIG. 4 and in partially broken away vertical section in FIG. 5. The working unit 22 consists essentially of (1) a head portion 23 containing a switch mechanism, (2) an intermediate cylindrical portion 25 containing electric cells 27 and a motor 28, and (3) a lower portion 31 containing gears and the like for the transmission of the motor rotation. A lever 24 for the operation of the switch mechanism contained in the head portion 23 extends out of the head 23 and is to be pulled or pushed for switching operation. This head portion 23, placed on top of the open end of the intermediate cylindrical portion 25, is ordinarily secured thereto by means of a revolvable clamp 26 connected at both ends to both sides of the intermediate portion 25, as illustrated in FIGS. 4 and 5.

The interior of the intermediate portion 25 is divided into two compartments, the upper compartment containing the easily removable electric cells 27 and the lower compartment containing the motor 28. These electric cells 27, inserted therein in the opposite directions with respect to each other, are respectively in contact with the terminals of the motor 28 and the switch terminals exposed at the bottom of the head portion 23.

An output shaft 29 of the motor 28 extends down into the lower portion 31, and a pinion 30 is secured at the lowermost end of the output shaft 29. The pinion 30 is in mesh with a crown gear 33 secured to an intermediate shaft 32 extending across the substantially flat-shaped lower portion 31. A pinion 34, secured to the intermediate shaft 32, is in mesh with a gear 36 secured to a drive shaft 35 extending below the intermediate shaft 32 in parallel therewith. Both ends of this drive shaft 35 protrudes out of the lower portion 31, and crankshfts 37 and 38 are secured to the ends of the drive shaft 35 with their webs in 180° or so different directions.

The bottom of the lower portion 31 is shaped semicircularly, with the center of the incomplete circle located at the drive shaft 35 (refer to FIG. 5 and 8A), and a plurality of transverse ridges 40 are formed on this arched bottom 39 at constant circumferential intervals and in parallel with each other. A stopper 41 is provided at the rearward termination of the ridges 40, whereas an engaging projection 42 is formed on the front side of the lower portion 31. Since these ridges 40 are for holding a bearing 45 in between, they may be replaced by grooves 43 as illustrated in FIG. 8B.

A pair of plate members 43 and 44 are respectively provided between both sides of the lower portion 31 and the crankshafts 37 and 38 at both ends of the drive shaft 35. Each of these plate members 43 and 44 has one of its ends connected to the drive shaft 35 and the other end to the bearing 45 running across the arched bottom 39. Hence the bearing 45 is made movable along the arched bottom 39 around the drive shaft 35, to be stopped anywhere thereon by means of the ridges 40. A pin 46 is inserted into the bearing 45, and a pair of webbed foot members 47 and 48 are pivoted at both ends of the pin 46 projecting out of both ends of the bearing 45. Each of these foot members 47 and 48 consists of a webbed foot portion 49, including a downwardly projecting heel, and a lever portion 50, with the pin 46 running therethrough between the two portions. The aforementioned crankshafts 37 and 38 are inserted into elongated holes 51 formed in the lever portions 50.

The working unit 22 described in the foregoing is constructed watertight, especially at the head portion 23 containing the switch mechanism, between the head portion 23 and the intermediate cylindrical portion 25, and at the portion 25 containing the electric cells and motor.

For installation of this working unit 22 in the casing 10, the unit 22 is inserted with its head foremost into the casing 10 in such a manner that the unit 22 is held securely among the ribs 17, 17', 18, 18', and that the projection 19 of the casing 10 engages the corresponding projection 42 of the unit 22. During the insertion, a slight turn in either direction should be given the unit 22 to let it pass clear of the projection 19 of the casing 10; both projections 19 and 42 will come in proper engagement by turning the unit 22 in the opposite direction when it is fully inserted.

The switch operating lever 24 is led out of the hole 11 of the casing 10, like the tongue of the penguin. With the casing 10 and the working unit 22 thus combined, the present penguin-shaped toy is completed.

Removal of the working unit 22 out of the casing 11 is usually necessary only for the replacement of the electric cells, which operation can be accomplished simply by turning the clamp 26 off the head portion 23 and detaching the head from the rest of the unit 22.

In use, the motor circuit is closed by means of the switch operating lever 24, and the rotation of the motor 28 is transmitted to the crankshafts 37 and 38, which then move the foot members 47 and 48. Since these webbed foot members 47 and 48 are pivoted in their middle by means of the pin 46, their webbed foot portions 49 start moving as if the penguin flutters its legs.

Placed in water, the toy swims with its head above the water surface (refer to FIG. 9C) when the foot members 47 and 48 are set substantially in parallel with the water surface. It will swim with its head below the water surface by turning the foot members toward the front of the toy (refer to FIG. 9D), and the swimming speed will vary according to the degree the members are turned. The toy shown in FIG. 9E is submerged due to the weight of water poured into the tank 13, the depth of the submergence being determined according to the amount of water contained therein. The swimming direction of the toy can be changed at will by rotating the rudders 20 and 21. When, for instance, the left-hand rudder 20 is set at right angles with the swimming direction of the toy as illustrated in FIG. 9F, it will swim in a counterclockwise turn due to the increased resistance offered to the water by that left-hand rudder. These rudders can of course be used to let the toy submerge or surface to the inpedent motion of the portion.

The pin 46 is movable along the arched bottom of the working unit 22, since it is made capable of so turning round by...
means of the plate members that are revolvable around the drive shaft 35. Hence the bearing 45 can be fixed between any two neighboring ridges (refer to FIG. 8A), or in any one groove (refer to FIG. 8B), of the arched bottom.

Thus, with adequate use of the foot members, rudders and water tank, the toy of the present invention makes varieties of very interesting performances in water. It is also possible, simply by setting the foot members at right angles with the axis of the working unit, to let the toy walk on solid surfaces in a wobbling gait of the penguin.

Although specific embodiments of the present invention have been shown and described in the foregoing, it will be obvious that a great many modifications thereof are possible. For instance, the casing may be shaped like a duck and many other animals in addition to the penguin employed for the illustration and description of the invention above. The invention, therefore, is not intended to be restricted to the exact showing of the drawings and the description thereof, but is considered to include reasonable and obvious equivalents.

I claim:

1. A toy comprising, in combination:
a watertight working unit removably installed in said casing and having a semicircularly shaped bottom on which are formed a plurality of ridges at constant circumferential intervals;
an electric motor connected to electric cells installed in said working unit;
a drive shaft geared to said motor and projecting out of both sides of said working unit near the bottom thereof;
a pair of crankshafts coupled to said drive shaft at both ends thereof;
a pair of plate members pivoted by said drive shaft and having a shaft connected therebetween, said shaft being revolvable around said drive shaft in agreement with said arched bottom of said working unit and being fixedly stopped at any circumferential position thereof by means of said ridges; and
a pair of flat foot members through which a pin running through said shaft is loosely inserted and which are moved by means of said crankshafts.

2. A toy as claimed in claim 1, in which said working unit includes a detachable head portion containing a switch mechanism, said head portion being detached usually for replacement of the electric cells contained in the rest of the working unit.

3. A toy as claimed in claim 1, in which said head portion includes an elongated switch operating lever which extends through said casing, so that said switch mechanism is operable from outside.

4. A toy as claimed in claim 3, in which the leading end of said switch operating lever protrudes like a tongue through an opening formed at the mouth portion of the animal-shaped casing.

5. A toy as claimed in claim 1, further comprising a pair of revolvable rudders on both sides of said casing, said rudders being shaped like the forelegs or wings of the animal in the shape of which said casing is formed.

6. A toy as claimed in claim 1, in which a water tank is formed inside said casing, said tank having a plugged hole opened through the casing.

7. A toy as claimed in claim 1, in which the webs of said crankshafts run substantially in 180° opposite directions, so that said foot members make swinging movements in an alternating manner.

8. A toy as claimed in claim 1, in which said foot members include downwardly extending heel portions which enable said toy to walk on solid surfaces.

9. A toy as claimed in claim 1, in which a plurality of grooves are formed on the semicircularly shaped bottom of said working unit instead of said ridges.

10. A toy characterized substantially in accordance with claim 1, wherein said casing is formed in the shape of a penguin.