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des brevets



(11)

**EP 1 925 350 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:

**28.05.2008 Bulletin 2008/22**

(51) Int Cl.:

**A63H 23/04 (2006.01)**(21) Application number: **07022389.6**(22) Date of filing: **19.11.2007**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR  
HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE  
SI SK TR**

Designated Extension States:

**AL BA HR MK RS**

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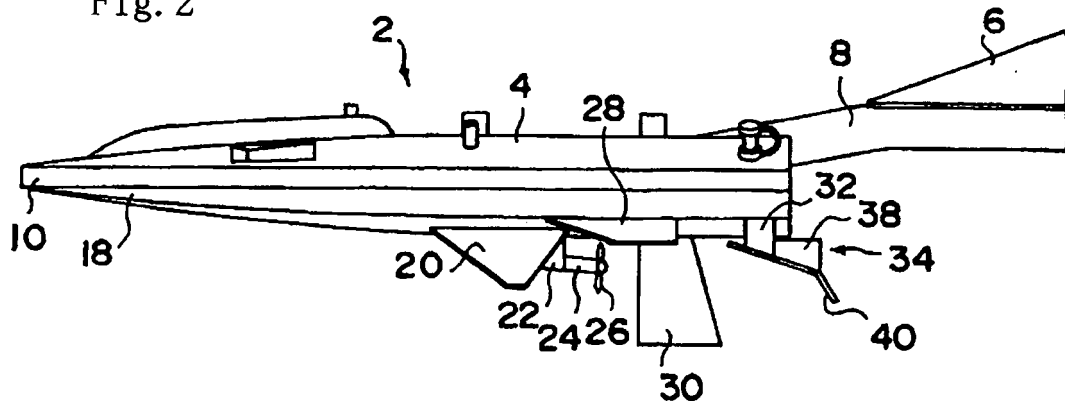
(54) **On-water/underwater movable toy**

(57) The present invention provides an on-water/underwater movable toy which has the optimal form for high-speed on-water cruising like a leisure boat and a racing boat, and which can also cruise underwater.

The on-water/underwater movable toy according to the present invention comprises: a hull having a boat-shaped deck board (4) that is in close contact with a boat bottom (18) without any clearance therebetween; a screw

(26) mounted under said boat bottom; a ladder (30) controllably mounted on said boat bottom; a recess (12) prepared on a boat stern, the recess getting deeper toward the direction of movement; and an elevator (34) disposed at the lower end of said recess, having a shape similar to that of said recess, and being controllably pivotable about a horizontal axis defined by the two elevator-holding axis supports (32) projecting downward from the rear portion of the boat bottom.

Fig. 2



## Description

### Background of the Invention

[0001] The present invention relates to a movable toy, and more particularly to an on-water/underwater movable toy which can cruise both on-water and underwater.

### Description of the Related Art

[0002] The conventional submersible toy is a submarine-shaped toy, for example, a toy that cruises on-water and is capable of brief and repetitive submerging and surfacing underwater. In the Patent Document 1 is proposed a submersible boat in a spindle form, the operation method of which is to utilize the reaction force that is generated when the water in the boat is pumped out.

[0003] Patent Document 1: Laid-open Patent Publication No. 2000-262771, FIG. 3 on Page 1

### Summary of the Invention

[0004] Typical conventional submersible on-water/underwater movable toy takes the form mostly of a spindle-shaped submarine. The submarine-type structure would involve projection of a plurality of elevators and horizontal planes against the side wall of the hull. This form was especially designed for underwater cruising, which was thus not optimal for high-speed on-water cruising like a leisure boat and a racing boat.

[0005] On the contrary, underwater cruising of a movable toy that takes the form of a leisure or racing boat would require mounting of horizontal plane and elevator on the side of the hull, which horizontal plane and elevator must be long enough to achieve the benefits necessary for underwater cruising. Installation of such a long elevator to a hull having an already great horizontal width would, however, lead to much greater horizontal width of the entire boat, resulting in an undesirable designing.

[0006] To solve the above-mentioned problems, the present invention is intended to provide an on-water/underwater movable toy which has the optimal form for high-speed on-water cruising like a leisure boat and a racing boat, and which is also capable of cruising underwater.

[0007] The on-water/underwater movable toy according to the present invention comprises: a hull having a boat-shaped deck board that is in close contact with a boat bottom without any clearance therebetween; a screw mounted under said boat bottom; a ladder controllably mounted on said boat bottom; a recess prepared on a boat stern, the recess getting deeper toward the direction of movement; and an elevator disposed at the lower end of said recess, having a shape similar to that of said recess, and being controllably pivotable about a horizontal axis defined by the two elevator-holding axis supports projecting downward from the rear portion of the boat bottom.

[0008] The movable toy cruises on water when said

elevator is horizontal in relation to the hull, while the toy can cruise underwater when the rear end of said elevator is brought pivotably downward in relation to the hull.

[0009] The toy can have a groove which is cut all around the hull, between said deck board and said boat bottom, except the rear portion thereof. Said recess can take such a form as to get greater in width toward the stern side and smaller in width toward the bow side, and said elevator can take an isosceles trapezoid form.

[0010] Said elevator, said ladder and said screw are remotely operable by radio control.

[0011] The on-water/underwater movable toy according to the present invention comprises: a hull having a boat-shaped deck board that is in close contact with a boat bottom without any clearance therebetween; a screw mounted under said boat bottom; a ladder controllably mounted on said boat bottom; a recess prepared on a boat stern, the recess getting deeper toward the direction of movement; and an elevator disposed at the lower end of said recess, having a shape similar to that of said recess, and being controllably pivotable about a horizontal axis defined by the two elevator-holding axis supports projecting downward from the rear portion of the boat bottom. This configuration enables less complicated structure of the movable toy, which has the optimal shape for high-speed on-water cruising like a leisure boat and a racing boat, and which is also capable of cruising underwater.

[0012] The movable toy cruises on water when said elevator is horizontal to the hull, while the movable toy can cruise underwater when the rear end of said elevator is brought pivotably downward in relation to the hull. This configuration enables the movable toy to be easy-to-navigate and to have the optimal shape for high-speed on-water cruising like a leisure boat and a racing boat, as well as to cruise underwater.

[0013] The groove which is cut around the hull, between said deck board and said boat bottom allows for more stable underwater cruising.

[0014] Said recess can take such a form as to get greater in width toward the stern side and smaller in width toward the bow side, and said elevator can take an isosceles trapezoid form. This configuration facilitates generation of greater driving force.

[0015] Furthermore, said elevator, said ladder and said screw being remotely operable by radio control, the movable toy can be free to surface and submerge, and free to cruise on-water and underwater, even when the operator of the toy is staying at a distance therefrom.

### Brief Description of the Drawings

[0016] An embodiment of the on-water/underwater movable toy of the present invention is described with reference to the drawings.

FIG. 1 is an oblique view of the entire on-water/underwater movable toy according to the embodiment;

FIG. 2 is a side view of the on-water/underwater movable toy according to the embodiment;

FIG. 3 is a magnified view of the recess of the on-water/underwater movable toy according to the embodiment;

FIG. 4 is a magnified view of the elevator of the on-water/underwater movable toy at the time of on-water cruising according to the embodiment;

FIG. 5 is a magnified view of the elevator of the on-water/underwater movable toy at the time of underwater cruising according to the embodiment; and

FIG. 6 is a block diagram relating to the radio-controlled operation of the on-water/underwater movable toy according to the embodiment.

### **Detailed Description of the Invention**

[0017] First of all, the embodiment will be described with reference to FIG. 1. An on-water/underwater movable toy 2 of the embodiment of the present invention is provided with a rear wing 6 supported by two supporting members 8 at the rear portion of a deck board 4 having a boat shape. A recess 12 comprising a recess surface 16 and an internal surface 14 is provided in between the two supporting members 8 at the rear portion of the deck board 4. The recess 12 is defined by the recess surface 16 and the internal surface 14; the recess 12 being smaller in width toward the recess surface 16, and greater in width toward the rear end thereof along the internal surface 14. An elevator 34, not depicted in FIG. 1, is configured to have an isosceles trapezoid shape, a shape similar to that of the recess 12. A groove 10 is cut all around the deck board 4, between said deck board 4 and said boat bottom 18, except the rear portion thereof.

[0018] Next, a boat bottom 18, which is the reverse side of the deck board 4, is described with reference to FIG. 2. The boat bottom 18 has a center board 20 projecting vertically downward from the longitudinal center thereof. A screw housing 22 is mounted adjacent to the center board 20 and backward against the direction of movement. A screw axis 24 is installed at the rear end of the screw housing 22 to project backward therefrom, and a screw 26 is rotatably mounted at the end of said screw axis 24.

[0019] A ladder 30 is mounted in a controllably rotatable manner, still further backward on the boat bottom with a predetermined distance from the screw 26. Two skegs 28, projecting from the boat bottom 18 and located across the screw 26 and the ladder 30, can enhance the water flow management.

[0020] An elevator 34 is mounted still further backward on the boat bottom with a predetermined distance from the ladder 30, such that the elevator 34 can be controllably inclined. The elevator 34 is inclinably pivotable between two elevator-holding axis supports 32 projecting downward from the rear portion of the boat bottom 18. The elevator 34 comprises an elevator bottom plate 36, elevator side plates 38 that are vertically arranged on

both sides of the elevator bottom plate 36, and a retainer plate 40 that is in communication with, and at a certain angle to, the elevator bottom plate 36.

[0021] The elevator 34 is inclinably pivotable between the elevator-holding axis supports 32, the elevator 34 being driven with a servomotor embedded inside the hull. A drive shaft 41 of the servomotor is projectingly mounted in the center of the internal surface 14 of the recess 12, as depicted in FIG. 3, to be combined with a crank 42. An aperture is prepared at an end of the crank 42 opposite to the other end where the drive shaft 41 is combined, the aperture engaging with a rod 44. A rod cover 46 attached to the rod 44 is pinned to the elevator side plate 38. The crank 42 can also be joined to the elevator side plate 38 by the rod 44 alone and without the rod cover 46 being attached.

[0022] With reference now to FIGS. 4 and 5 that depict the operation of the elevator 34, the operation of the on-water/underwater movable toy 2 of the embodiment of the present invention will be described.

[0023] The screw 26 rotates in response to the signal from a transmitter, propelling the on-water/underwater movable toy 2 forward, and the direction of movement changes as the ladder 30 shifts its direction.

[0024] As the servomotor embedded in the hull rotates to move the outer end of the crank 42 upward until the elevator 36 is horizontal to the hull by way of the rod 44 and the rod cover 46, the driving force is directed upward and forward (direction A) in relation to the hull's horizontal direction. Then, the boat bow moves upward in relation to the hull's horizontal direction to bring the hull to the on-water cruising operation, which is a horizontal operation like regular vessels.

[0025] On the contrary, as the servomotor embedded in the hull rotates to move the outer end of the crank 42 down until the rear end of the elevator 36 is brought pivotably downward in relation to the hull by way of the rod 44 and the rod cover 46, the driving force is directed downward and forward (direction B) in relation to the hull's horizontal direction. Then, the boat bow moves downward in relation to the hull's horizontal direction to bring the hull to the underwater cruising operation.

[0026] The on-water/underwater movable toy of the present invention can thus have the optimal shape for high-speed on-water cruising like a leisure boat and a racing boat, and at the same time, can cruise underwater and on-water.

[0027] With reference now to FIG. 6 that shows a block diagram, the radio-controlled remote operation of the on-water/underwater movable toy 2 of the present invention will be described.

[0028] FIG. 6 is a block diagram illustrating the configuration of the on-water/underwater movable toy 2 of the present invention, the on-water/underwater movable toy 2 comprising a steering and driving section 43, a screw driving section 44, an elevator driving section 46, and a control section 50 that controls the ladder 30, the screw 26 and the elevator 36.

**[0029]** The on-water/underwater movable toy 2 further comprises: an antenna 56 that catches a control signal from a transmitter 54; a signal receiving section 48; a control section 50 that controls each driving section in response to said control signal; a steering and driving section 43 that drives, in response to a control signal from said control section 50, a ladder 30 mounted in the hull; a screw driving section 44 that drives a screw 26 in response to the control signal from said control section 50; an elevator driving section 46 that drives an elevator 36 designed to switch-control the on-water and underwater cruising operations; and a power section 52.

**[0030]** FIG. 6 further illustrates the embodiment of the on-water/underwater movable toy 2 of the present invention. The steering and driving section 43 and the elevator driving section 46 comprise a servomotor, respectively, and the screw driving section 44 comprises a conventional electric motor.

**[0031]** Operation of on-water cruising of the movable toy 2 is controlled in the following manner: the transmitter sends out a control signal, which causes the receiving section 48 to send out another control signal through the control section 50 to the elevator driving section 46, thereby pivotably lifting the rear end of the elevator bottom plate 36 (adjacent to the retainer plate 40) of the elevator 34.

**[0032]** Operation of underwater cruising of the movable toy 2 is controlled in the following manner: the transmitter sends out a control signal, which causes the receiving section 48 to send out another control signal through the control section 50 to the elevator driving section 46, thereby pivotably bringing down the rear end of the elevator bottom plate 36 (adjacent to a retainer plate 40) of the elevator 34.

**[0033]** The on-water/underwater movable toy of the present invention can thus have the optimal shape for high-speed on-water cruising like a leisure boat and a racing boat, and at the same time, can cruise underwater and on-water.

**[0034]** While the embodiment of the present invention has been described and shown as a configuration in which a groove 10 is cut all around the deck board 4, between said deck board and said boat bottom, except the rear portion thereof, it is also within the design variation of the present invention to arrange the configuration without the groove 10.

a recess prepared on a boat stern, the recess getting deeper toward the direction of movement; and

an elevator disposed at the lower end of said recess, having a shape similar to that of said recess, and being controllably pivotable about a horizontal axis defined by the two elevator-holding axis supports projecting downward from the rear portion of the boat bottom.

2. The on-water/underwater movable toy according to Claim 1, which cruises on water when said elevator is horizontal in relation to the hull, and which can cruise underwater when the rear end of said elevator is brought pivotably downward in relation to the hull.
3. The on-water/underwater movable toy according to Claim 1, having a groove which is cut all around the hull, between said deck board and said boat bottom, except the rear portion thereof.
4. The on-water/underwater movable toy according to Claim 1, wherein said recess takes such a form as to get greater in width toward the stern side and smaller in width toward the bow side, and wherein said elevator takes an isosceles trapezoid form.
5. The on-water/underwater movable toy according to Claim 1, wherein said elevator, said ladder and said screw are remotely operable by radio control.

## Claims

1. An on-water/underwater movable toy comprising:

a hull having a boat-shaped deck board that is in close contact with a boat bottom without any clearance therebetween;  
a screw mounted under said boat bottom;  
a ladder controllably mounted on said boat bottom;

Fig. 1

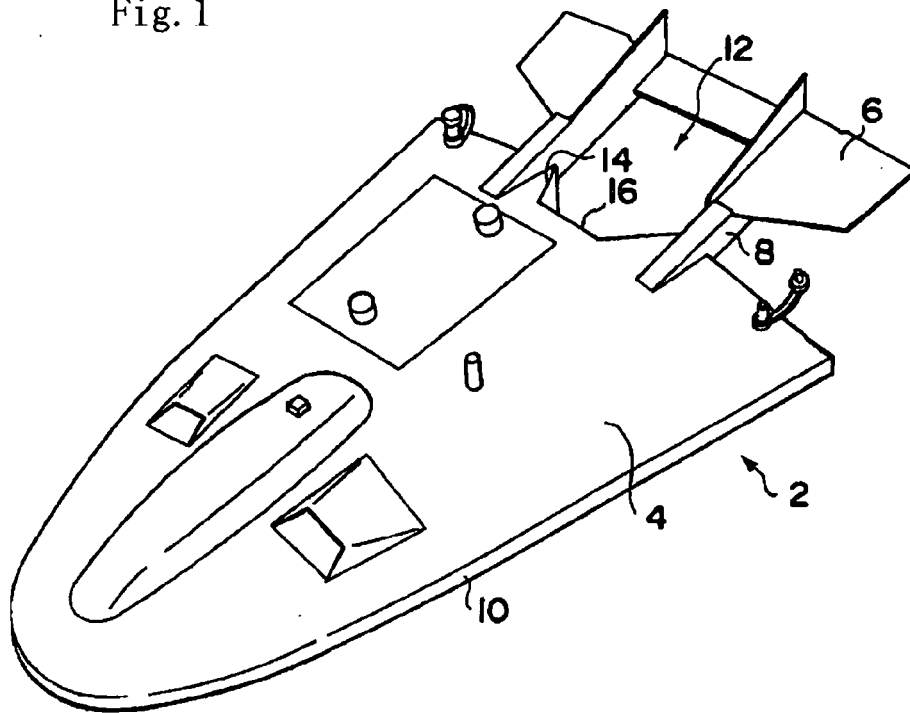


Fig. 2

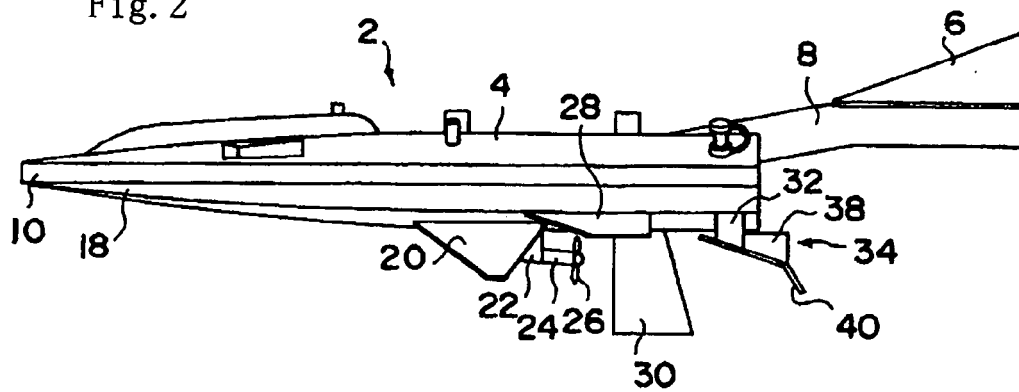


Fig. 3

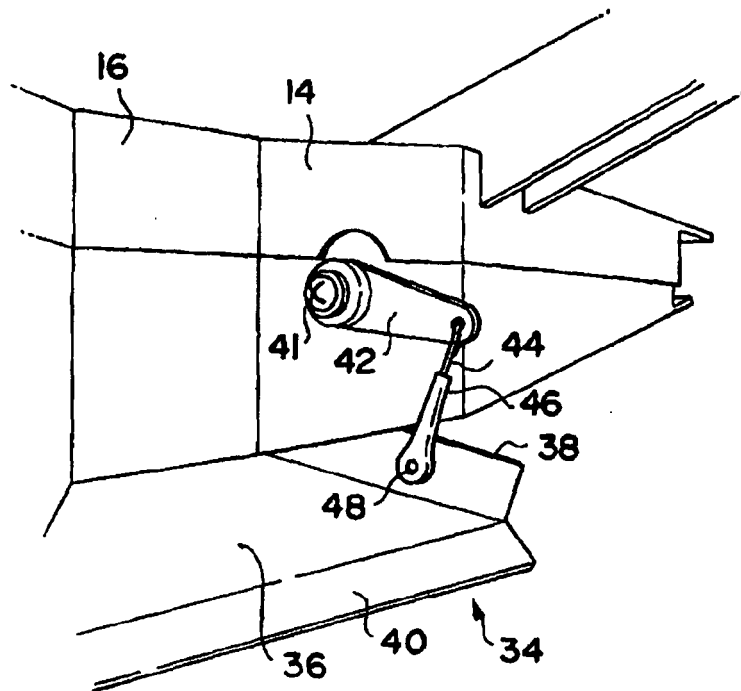


Fig. 4

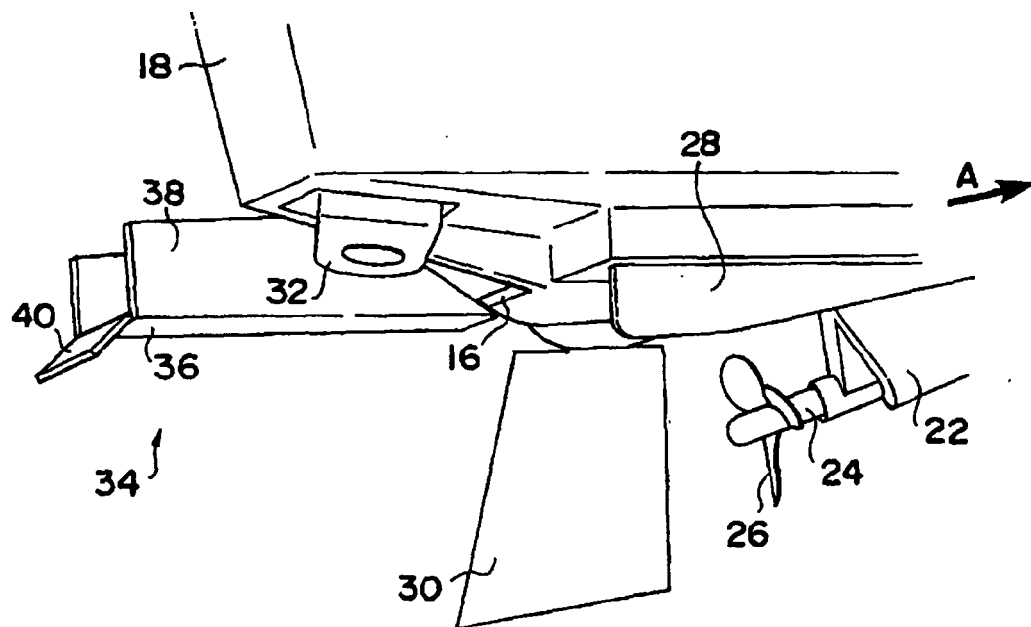


Fig. 5

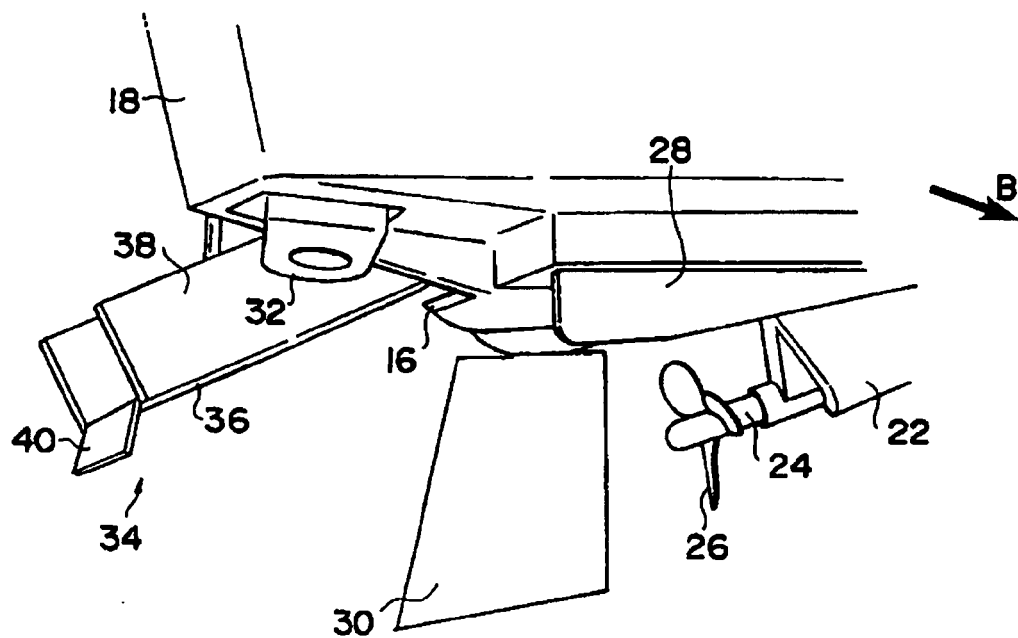
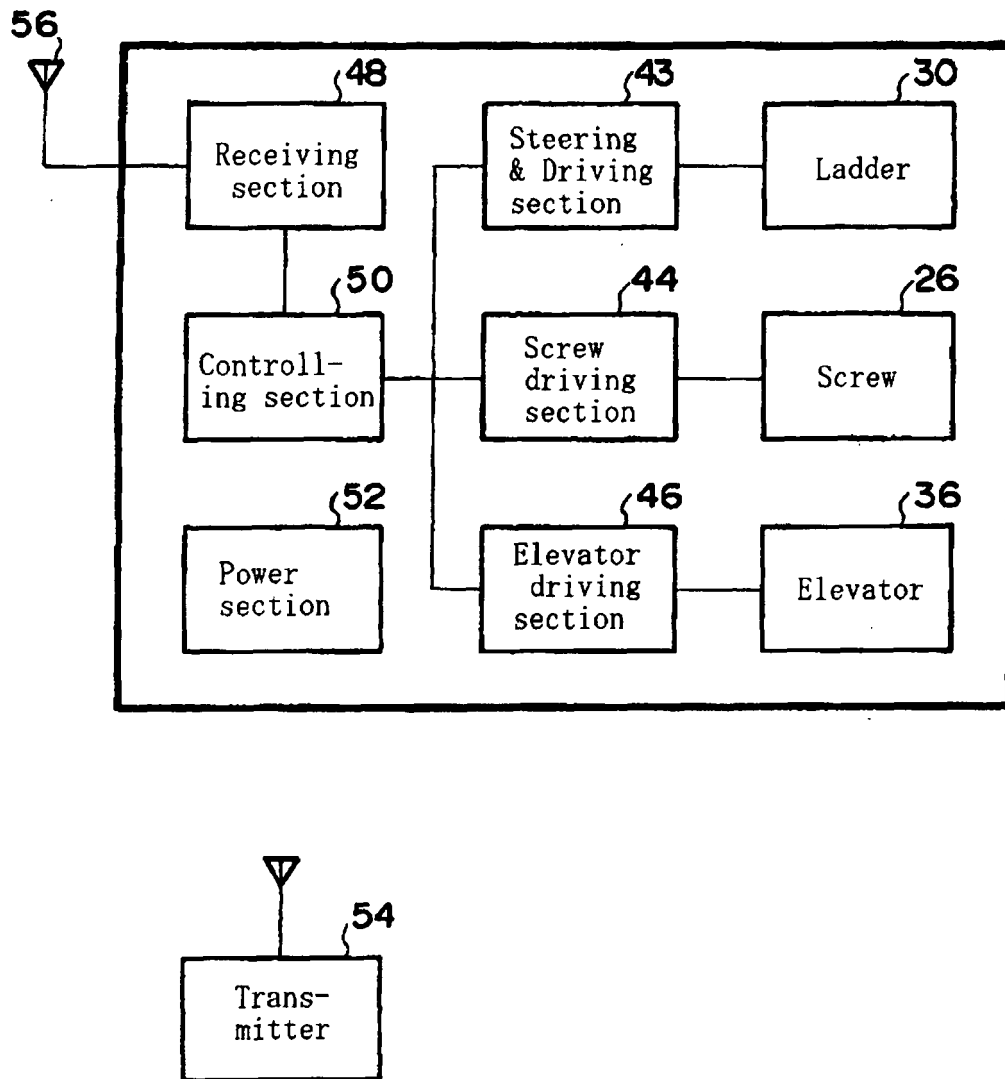


Fig. 6





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Application Number  
EP 07 02 2389

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                               |                                                     |                                         |
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| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document with indication, where appropriate, of relevant passages                                                                 | Relevant to claim                                   | CLASSIFICATION OF THE APPLICATION (IPC) |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                               |                                                     |                                         |
| Place of search<br>Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                               | Date of completion of the search<br>4 February 2008 | Examiner<br>Turmo, Robert               |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                               |                                                     |                                         |

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 07 02 2389

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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04-02-2008

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**REFERENCES CITED IN THE DESCRIPTION**

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