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(71) Applicant: **Imc. Toys, S.A.**
08224 Terrassa (Barcelona) (ES)

(72) Inventors:
• **Nuñez Serrano, Sergio**
08917 Badalona (Barcelona) (ES)
• **Noguer de Palol, Joan**
17150 Sant Gregori (Girona) (ES)

- **Gomez Humet, Blai**
08003 Barcelona (ES)
- **Chun Hung, Tsang**
N.T. H.K. (HK)
- **Bru Cervera, Albert**
08302 Mataro (Barcelona) (ES)
- **Puig Pascual, Joan**
08191 Rubi (Barcelona) (ES)
- **Levy Botbol, Jacob**
08206 Sabadell (Barcelona) (ES)
- **Fernandez Rodriguez, Miguel Angel**
08924 Santa Coloma (Barcelona) (ES)

(74) Representative: **Durán Moya, Luis-Alfonso et al**
Durán-Corretjer
Còrsega, 329
08037 Barcelona (ES)

(54) **Toy**

(57) A toy, characterised in that it comprises in combination a user control (1), an independent moving part (3), and an independent piece which has to be found (2), in which the independent piece which has to be found has means for emitting at least one wireless signal, and the independent moving part comprises means for receiving commands from the user's control, means for receiving a signal or signals originating from the piece which has to be found, means for movement, means for seeking the origin of the said signal or signals from the piece which has to be found, means for directing the moving part to the place from which the signals originate, and means for picking up the piece which has to be found and bringing it to the user.

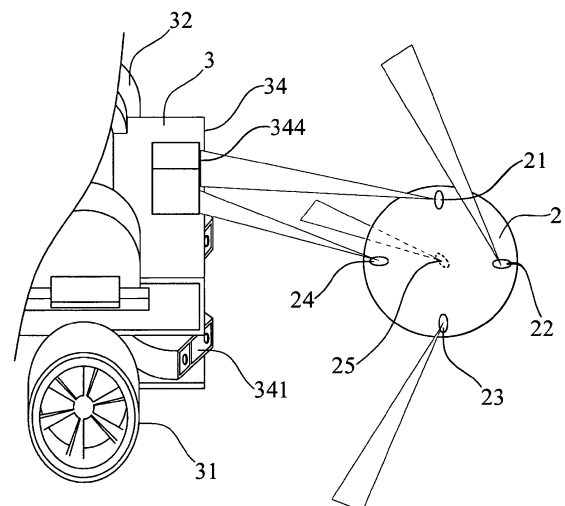


FIG.2

Description

[0001] This invention relates to a toy.

[0002] More particularly, this invention relates to a novel toy which comprises a moving part designed to seek an object and bring it to the user.

[0003] In the present toy market there are many electronic devices with movements, including devices which interact with the user, as in the case of so-called animatronics.

[0004] On the other hand, toys of low weight but with the ability to move and an object-catching device are known. However, these toys have to be directed towards the objective by the user, who must give the command to catch the object and carry it to the desired position.

[0005] Toys which follow a corresponding signal to the user are also known.

[0006] However, no existing toys are capable of independently detecting an object, independently picking it up and then bringing it to the user.

[0007] The toy to which this invention relates behaves in the same way as a pet dog, that is to say, when the user throws an object the moving part seeks the thrown object, picks it up and brings it to the user.

[0008] In this way the toy interacts with the user in an active way, in a similar way to that in which a pet animal would do.

[0009] In a basic embodiment the toy to which this invention relates comprises:

- a user control,
- an independent moving part, and
- an independent piece which has to be found, in which
- the independent piece which has to be found has means for emitting at least one wireless signal and,
- the independent moving part comprises:
- means for receiving commands from the user's control,
- means for receiving a signal or signals proceeding from the piece which has to be found,
- means for movement,
- means for finding the origin of the said signals from the piece which has to be found,
- means for moving the moving part towards the place from which the signals originate, and
- means for picking up the piece which has to be found, and bringing it to the user.

[0010] These characteristics make it possible for the toy to which this invention relates to take independent decisions in real time in order to achieve its objective (finding the piece which has to be found which was previously thrown by the user), interacting with the user through a third object (the piece which has to be found).

[0011] Unlike other toys, the toy to which this invention relates has decisionmaking capability in real time, without the user having to take decisions about the route which has to be followed in order to pick up the piece which has

to be found, even in initially unforeseen situations. Preferably, in order to achieve this, the means for seeking the origin of the signal and the means for directing the moving part to the place from which the signals originate and the means for picking up the piece which has to be found and bringing it to the user have decisionmaking means which are independent of the user's control; the said decisionmaking means may, for example, comprise a microcomputer, a circuit board and an electronic memory.

[0012] The presence of emitters on the piece which has to be found makes the toy economical and simple to construct, something which is of prime importance for its practical application. Preferably the said emitters will be of the infrared type and more than one will be provided so as to ensure that the signal will be received independently of the position adopted by the piece which has to be found once it has been thrown. In order to prevent interference the infrared receiver of the independent moving part intended to receive the signal or signals from the piece which has to be found will have a band pass filter in order to prevent interference originating from other infrared sources whose frequency does not coincide with the emitter.

[0013] In an especially preferred way, this invention provides that the said infrared receiver is only capable of capturing signals originating in a direction perpendicular to the frontal plane of the receiver. This feature enormously simplifies the toy's computational and system requirements, as the toy will direct itself frontally towards the object which has to be found.

[0014] The user's control may preferably comprise a remote control, with the main functions of switching on the toy and, optionally, issuing a command for the moving part to return to the user.

[0015] As for the moving part, this may, for example, have the shape of an animal or the like, for example a dog, inasmuch as its behaviour is similar to that of a pet dog.

[0016] Preferably, the means for seeking the origin of the signal or signals from the piece which has to be found will comprise means so that the moving part rotates 360° about an axis until it encounters the said signal or signals. This feature makes it possible to simplify both the toy and the search for the piece which has to be found. In order to achieve this 360° rotation, for example, the said means for movement preferably comprise a system of two wheels, each having an independent motor, and one idling wheel or pivot.

[0017] In order to provide the moving part with independence and decisionmaking capability so that it can seek the origin of the signal from the piece which has to be found, direct itself towards it and avoid collisions with obstacles, it will comprise at least one control device, preferably comprising a microcontroller, a circuit-board and an electronic memory for the storage of instructions.

[0018] In order to avoid collisions with obstacles in its path the moving part may comprise detection sensors,

preferably of the infrared type, and a speed and direction control system governed by a control device.

[0019] In an embodiment of extremely simple design the means for picking up the piece which has to be found will comprise a concavity, or may also comprise means for capturing the piece which has to be found. It may also comprise a sensor system to detect the piece which has to be found once the latter is located in the said means for picking up the piece.

[0020] The control device will comprise means (in the form of circuits, memorised instructions, or any other means) for the toy to carry out the following operations in succession and independently:

- seeking the signal from the piece which has to be found
- moving to the piece which has to be found
- capturing the piece which has to be found
- optionally, remaining in a rest position until it receives a command from the user's control, and
- bringing the piece to the user.

[0021] For a better understanding of the invention, drawings of embodiments of this invention are appended by way of an explanatory but non-restrictive example.

Figure 1 is a front elevation view of a diagrammatical illustration of a possible embodiment of a toy according to this invention. This shows the functional elements of the moving part, with an external cover as a dashed line.

Figure 2 is a perspective view of a diagrammatical illustration of the functional elements and the front of a possible embodiment of a toy according to this invention, devoid of the decorative part.

Figure 3 is a diagrammatical view showing detection of the part of the toy which has to be found by the moving part thereof.

Figure 4 is a diagrammatical view of elements located in the base of an embodiment of the toy according to this invention which provide the toy with adequate mobility.

Figures 5, 6 and 7 are diagrammatical figures showing a possible method of using the toy according to this invention.

Figure 8 is a block diagram of a process carried out by a toy according to this invention.

Figures 1 to 8 refer to different embodiments of the toy according to the invention, but similar elements coinciding in different embodiments have been identified using the same numbers.

[0022] According to this invention and with reference to Figures 1 to 8, the toy to which this invention relates comprises:

- a user control -1-, for example a remote control, as shown in the various figures.

- an independent piece -2- which has to be found, for example a ball, as shown in the various figures.
- an independent moving part -3-, which is the main part of the toy and which imitates the behaviour of a living being.

[0023] In order to achieve the objectives of this invention the independent moving part comprises:

- means for receiving commands from the user's control -1-. The particular embodiment of these means will depend on the choice of user control -1- adopted for each specific embodiment of the device according to the invention,
- means -341-, -342-, -343- for receiving a signal or signals originating from the independent piece -2- which has to be found.
- means for its displacement -31-, -32-, -33-, -321-, -322-.
- means for seeking the origin of the said signals from the piece which has to be found, which must emit commands to the moving piece -3- so that it moves to meet the signals emitted by the piece which has to be found -2-, and once having located the said signal or signals moves towards the said piece which has to be found -2-, that is to say towards the place from which the signal or signals originate,
- as well as means -34- to pick up the piece which has to be found and bring it to the user.

[0024] Specifically, the toy to which this invention relates is physically divided into at least two independent parts (the piece which has to be found -2- and the moving part -3-), although preferably it will be divided into three physical parts: the user control -1-, the piece which has to be found -2- and the moving part -3-.

[0025] Nevertheless, from a functional point of view, the toy, as indicated, incorporates a larger number of systems, concerning which comments will be made below with respect to preferred embodiments.

User control -1-

[0026] The user control may be implemented in various ways. For example the user control may be implemented in the moving part -3- in the form of an on or off button.

[0027] However, preferably, user control -1- may be a remote control, for example of an infrared control, which will enable the user -100-, for example, to issue commands to start a search and return to the user.

[0028] In the case where user control -1- is a remote control, the moving part -3- may for example incorporate the specific communications port for remote control -1-.

Piece which has to be found -2-

[0029] The piece which has to be found -2- may be of any shape. It will be advantageous if it has a spherical

shape, because this shape will enable it to roll freely. In addition to this, this shape has the advantage that it most conveniently simulates play between a boy and his pet.

[0030] However, the spherical shape gives rise to the problem of being able to foresee the position in which ball -2- will stop. In order to overcome this problem the piece which has to be found will preferably comprise a plurality of emitters, preferably five -21-, -22-, -23-, -24-, -25-. The emitters may in this way be preferably of the infrared type, which have the advantage that they are light, durable and cheap. An example of a useable infrared emitter may be the emitter IE-0545 marketed by the Waitrony company, with a radio emission of 10 metres, which is adequate for this application.

[0031] Nevertheless, it would also be possible for example to use an ultrasound emitter.

[0032] The presence of an emitter system in the piece which has to be found makes it possible to lighten and simplify the toy, reducing costs and making it possible for it to be mass manufactured in large quantities.

Moving part -3-

[0033] Moving part -3- of the toy to which this invention relates is independent. In this invention "independent" means that there are no supply or information transfer cables. On the other hand it is also highly recommendable that it should be handlable, in particular that its weight should not exceed 2 kg. Furthermore, the moving part of the object of this invention has means which will enable it to take its own decisions, for example, in order to overcome obstacles, as will be seen subsequently.

[0034] In addition to this it is recommendable that the external part of the moving part should be of an attractive shape, for example similar to that of an animal, although this is not strictly necessary. In any event it is highly recommendable that the chassis should not have any cutting edges or clefts which might catch a user's finger, given its application to a juvenile public.

[0035] It must be borne in mind that the moving part must support a battery, the motor system, the corresponding sensor system and the control device (for example integrated circuits). We will describe the different parts and systems located in moving part -2- below.

System for receiving the signal from the piece which has to be found

[0036] The system -43- for receiving the signal from the piece which has to be found -2- will preferably be an infrared receiver. The accuracy of the finally constructed toy will depend on this item. Location of the element within moving part -3- and focusing of the element is therefore of special importance.

[0037] Both the signal emitter and the receiver system must avoid common interference from IR sources such as sunlight and house lighting. For this purpose the receiving system -344- will have a pass band filter, of pref-

erably 28.5 kHz, so that the receiver only receives infrared light which "blinks" 28,500 times per second. A receiver such as the PIC1018 SMB manufactured by Waitrony will for example be used.

[0038] The location and focusing of receiving sensor -43- will depend on the final shape given to the moving element and the location of emitters -21-, -22-, -23-, -24-, -25- in the piece which has to be found -2-. In general it is convenient that sensor -344- should be located in a projecting part of moving element -3-, but preferably in the middle of the frontal plane, as seen in the figures. Also preferably receiver -344- will be covered in such a way that it only receives signals originating perpendicularly to the frontal plane of the sensor. In this way the necessary accuracy will be achieved when the piece which has to be found -2- is in line with moving part -3-. This feature enormously simplifies the task because when sensor -344- detects piece which has to be found -2- the moving part only has to advance in a straight line, because it is clear that it lies immediately in front.

Obstacle detection system

[0039] Preferably the moving part will also have a system for detecting obstacles which may lie in its path.

[0040] For this invention it is necessary that the detector system should have a short response time, that the sensor system should be independent of the material, colour and light of the obstacle, have relatively low consumption and be capable of being installed in an independent moving part -3-, that is without cables, of small weight and size. In accordance with studies carried out, for this invention it is preferable that the obstacle detector system should comprise infrared detector sensors. For this application infrared sensors have the advantage that they are sensitive and cheap, no great detection distance or calculation of the distance of the object being required, as the aim which has to be achieved is that moving part -3- should not impact against the obstacle detected. Different embodiments incorporating three obstacle detector sensors -341-, -342-, -343- may be seen in the figures. According to tests carried out, these are sufficient for the embodiments illustrated. An example of a sensor complying with the specifications mentioned here is the GP2D15 sensor from the Sharp company.

Motor system for the moving part

[0041] Preferably moving part -3- will have the ability to rotate about an axis. As will be described subsequently, this rotation aids location of the piece which has to be found -2-.

[0042] This may advantageously be achieved, as seen in Figure 4, by means of two parallel wheels -31-, -32- each of which has a drive motor -321-, -322-, together with a pivot or idling wheel -33-. This system with a pivot or idling wheel -33- avoids complicating the toy electronically, being of simple construction. Motors -321-, -322-

may be of the conventional type, including a power as low as 1W, according to each specific application. The motors will include the corresponding drivers which will allow them to be controlled differentially by a control device.

Speed of movement sensor system

[0043] Preferably, in order to provide the toy with greater precision, the robot may be equipped with motor speed measuring sensors -311-, -321-. Commercially available encoders of the optical type may be used for this. A suitable encoder for this application may for example emit a counting pulse every approximately 0.4 cm. The sensor system is not illustrated in the figures.

Independent power supply system

[0044] Being an independent element with the ability to move, moving part -3- will have the corresponding independent power supply system, because the invention dispenses with supply cables. This system could comprise a battery, preferably a rechargeable one providing a voltage difference of 12V, which is not heavy, for example a rechargeable NiCd battery of some 800 mA and 12 V supplemented with a power source depending on the elements incorporated in the system.

Means for recovering the piece which has to be found

[0045] Moving part -3- may have means which will enable it to recover the piece which has to be found in order to bring it to the user. In the embodiments illustrated the front part of moving part -34- has a concavity which can be used to collect the ball or moving part -2- and bring it to the user. It is also possible, for example, to have means for capturing the piece which has to be found, such as suction cups or clamps, although this could from the technical point of view unnecessarily complicate the toy.

[0046] In addition to this, the means for collecting the piece which has to be found will be associated with direct or indirect means for determining whether the piece which has to be found -2- is or is not within receiving zone -34-.

Other systems

[0047] Given its nature as a toy, moving part -3- may also comprise systems emitting light and music.

System for the control of moving part -3-

[0048] The system or device for controlling moving part -3- is essential so that the various systems coordinate so that the toy fulfils its primary aim, that is to locate the piece which has to be found -2-, approach it and return it to the user.

[0049] Specifically, the control system will save the

functioning processes of the toy and will execute precise commands in relation to the inputs originating from the various systems in moving part -3-.

[0050] Various technologies on which this element can be based are now commercially available, such as PICS, PLCs, microcontrollers and also DSP.

[0051] A possible embodiment (not illustrated in the figures) may for example comprise an 8 bit microcontroller of CMOS technology encapsulated with 18 pins (for example Philips 80C 522 microcontroller) which has the advantage of being an element of a known type, a circuit board incorporating the said microcontroller and an electronic memory containing the instructions for the microcontroller, together with the necessary communications ports for the various systems.

Functioning of the toy

[0052] The functioning of the toy to which this invention relates is illustrated in Figures 5 to 8.

[0053] Figures 5 to 7 illustrate the basic intended functioning of the toy to which this invention relates. The user -100- throws the piece which has to be found -2- and the moving part -3- seeks a signal emitted by the emitters -21- to -25- in the moving part. Once the signal has been located by sensor -344- or corresponding sensors, moving part -3- approaches the piece which has to be found -2-, avoiding the obstacles in its path on the basis of the commands given by the control device based on data received from obstacle sensors -341-, -342-, until the piece which has to be found lies in receiving zone -34-. The moving part then moves the piece which has to be found -2- to user -100-.

[0054] Figure 8 is a block diagram which makes reference to the main procedure included in the electronic memory located in the control device circuit. In particular, when the toy (plus specifically moving part -2-) is switched on, it starts by giving an activity signal -2001- (for example the dog raises its head, which could incorporate a movement of the communications port with user control -1-, and for example may perform a circular movement -2002-, for example on pivot -33-. This rotation about pivot -33- allows for a 360° sweep seeking a signal originating from emitters -21- to -25- of the piece which has to be found and/or a signal originating from remote control -1-. If the signal from the piece which has to be found -2- is detected, the moving part proceeds -2006- to determine by any known means whether the piece which has to be found -2- is located in receiving zone -34-. If it does not find it it begins a search routine -2008- advancing forwards towards the piece which has to be found -2-, for example after emitting a search signal -2007-, for example lowering its head. If the piece which has to be found -2- is located in the receiving zone, moving part -3- may begin a routine of "picking up the piece" -2006-, for example, closing its legs, lowering its head, activating gripping means or in any other way. This routine will preferably also include disabling of the sensors

for locating the signal from the piece which has to be found -2-.

[0055] If on the other hand the dog detects a user signal -2004-, for example corresponding to a command to approach, the dog will begin previously mentioned routines -2007-, -2008- in such a way that it approaches the user -100-, bringing towards him the piece which has to be found -2- if this is in reception zone -34-.

[0056] Of course the toy to which this invention relates is not necessarily restricted to the procedure described here, and this may be modified, by simplifying it or by introducing other subroutines. For example it will be possible to ensure that the moving part begins a routine to change its initial position once it has captured the ball, which starts a routine for searching for a signal originating from the user instead of waiting to receive a command as is the case in the diagram in Figure 8.

[0057] Of course the control device will also comprise instructions for carrying out other procedures, such as for example control of speed, direction and distance run, and procedures to avoid obstacles detected by obstacle detectors -341-, -342-, -343-, which may easily be implemented by those skilled in the art on the basis of their available knowledge and the contents of this specification.

[0058] Although the invention has been described in relation to preferred embodiments, these must not be regarded as restricting the invention, which will be defined by the broadest interpretation of the following claims.

Claims

1. A toy, **characterised in that** it comprises in combination

- a user control,
- an independent moving part, and
- an independent piece which has to be found, in which
- the independent piece which has to be found has means for emitting at least one wireless signal, and
- the independent moving part comprises:
 - means for receiving commands from the user's control,
 - means for receiving a signal or signals originating from the piece which has to be found,
 - means for movement,
 - means for seeking the origin of the said signal or signals from the piece which has to be found,
 - means for directing the moving part to the place from which the signals originate, and
 - means for picking up the piece which has to be found and bringing it to the user.

2. A toy according to claim 1, **characterised in that**

the means for seeking the origin of the signal and the means for directing a moving part towards the place from which the signals proceed and the means for picking up the piece which has to be found and bringing it to the user have decisionmaking means independent of the user's control.

3. A toy according to claim 1 or 2, **characterised in that** the independent piece which has to be found has at least one infrared emitter, and the independent moving part has at least one infrared receiver capable of capturing the signal originating from the independent piece which has to be found.

4. A toy according to claim 3, **characterised in that** the infrared receiver is capable of capturing a signal originating from a direction perpendicular to the frontal plane of the receiver.

5. A toy according to claims 3 or 4, **characterised in that** the receiver has a pass band filter to filter out infrared signals whose frequency does not coincide with that of the emitter.

6. A toy according to any one of claims 3 to 5, **characterised in that** the independent piece has a plurality of infrared emitters.

7. A toy according to any one of claims 1 to 6, **characterised in that** the piece which has to be found is in the form of a ball.

8. A toy according to any one of claims 1 to 7, **characterised in that** the user's control is a remote control.

9. A toy according to any one of claims 1 to 8, **characterised in that** the independent moving part has the external shape of an animal.

10. A toy according to any one of claims 1 to 9, **characterised in that** the said movement means comprise a system of two wheels, each having an independent motor, and an idling wheel or pivot, so that the moving part can rotate 360° around the said pivot.

11. A toy according to any one of claims 1 to 10, **characterised in that** the movement means comprise a system for controlling the speed and movement of the moving part.

12. A toy according to any one of claims 1 to 11, **characterised in that** the said speed and movement control system comprises at least one optical encoder.

13. A toy according to any one of claims 1 to 12, **characterised in that** the means for seeking the origin of the signal or signals from the piece which has to be found comprise an electronic control device.

14. A toy according to any one of claims 1 to 13, **characterised in that** the means for seeking the origin of the signal or signals from the piece which has to be found comprise means so that the moving part can rotate 360° about an axis until it encounters the said signal or signals. 5
15. A toy according to any one of claims 1 to 14, **characterised in that** it comprises sensors to detect obstacles. 10
16. A toy according to claim 15, **characterised in that** it comprises electronic control means to vary movement so as not to collide with an object detected by the sensors for detecting obstacles. 15
17. A toy according to claims 15 or 16, **characterised in that** the sensors to detect obstacles are infrared sensors. 20
18. A toy according to any one of claims 1 to 17, **characterised in that** the means for picking up the piece which has to be found comprise a concavity.
19. A toy according to any one of claims 1 to 18, **characterised in that** the means for picking up the piece which has to be found comprise means for capturing the piece which has to be found. 25
20. A toy according to any one of claims 1 to 19, **characterised in that** the moving part comprises a sensor system for detecting a piece which has to be found located in the means to pick up the piece which has to be found. 30
21. A toy according to any one of claims 1 to 20, **characterised in that** the moving part comprises a control device which controls and coordinates its parts. 35
22. A toy according to claim 21, **characterised in that** the control device comprises at least one integrated circuit, a microcontroller and an electronic memory device with instructions for operating the microcontroller. 40
23. A toy according to claim 21 or 22, **characterised in that** the control device comprises means so that the toy carries out the following operations in succession and independently: 45
- seeking the signal from the piece which has to be found,
 - moving to the piece which has to be found,
 - capturing the piece which has to be found,
 - bringing the piece which has to be found to the user. 50
24. A toy according to claim 23, **characterised in that** 55

the control device comprises means for holding the moving part at rest after it captures the piece which has to be found until it receives a command from the user's control.

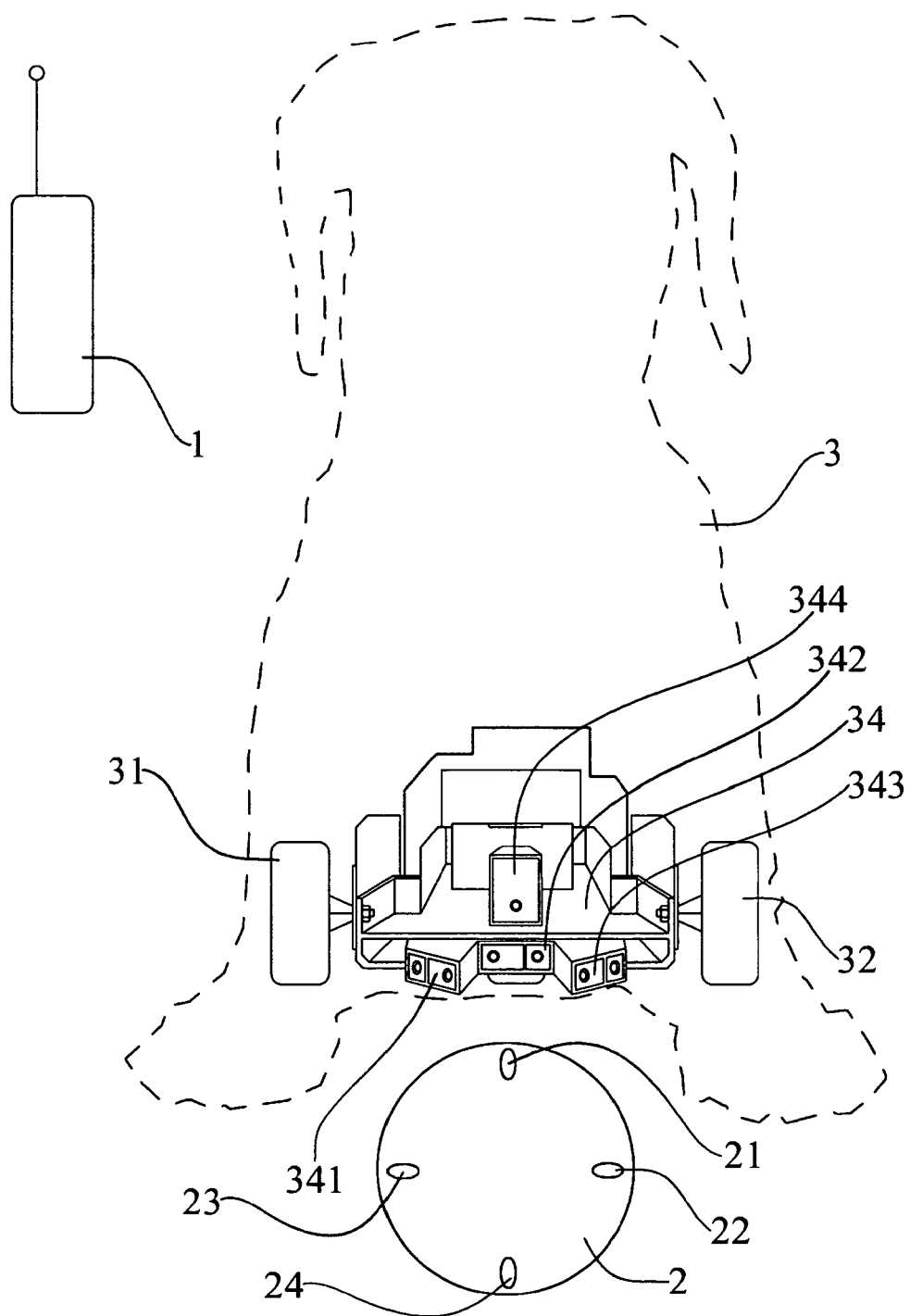


FIG.1

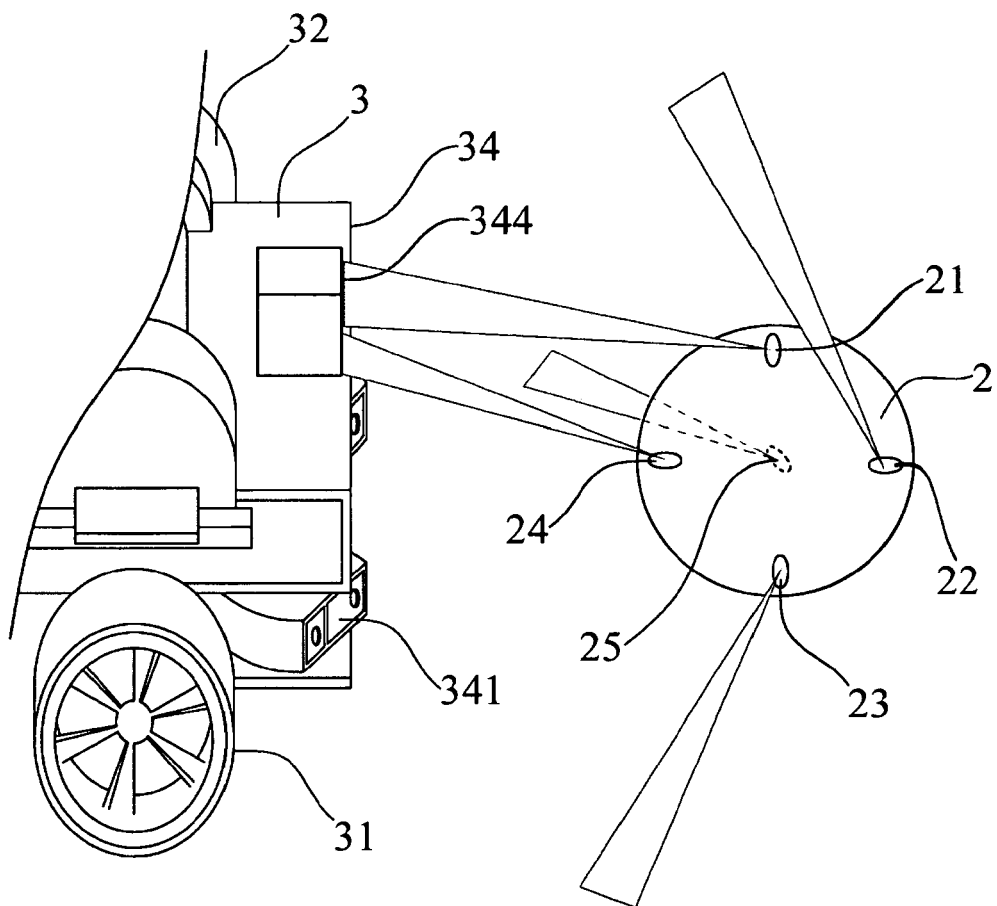


FIG.2

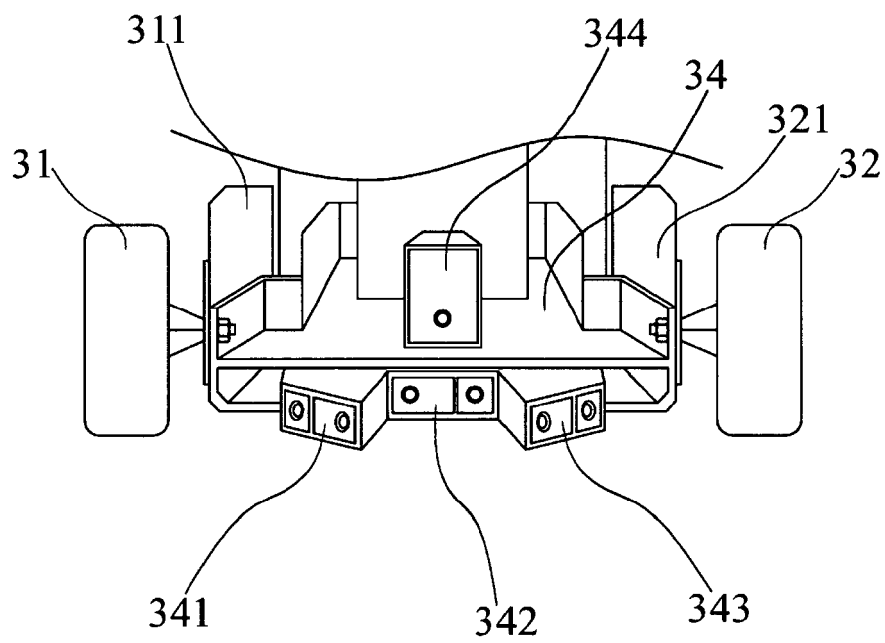


FIG.3

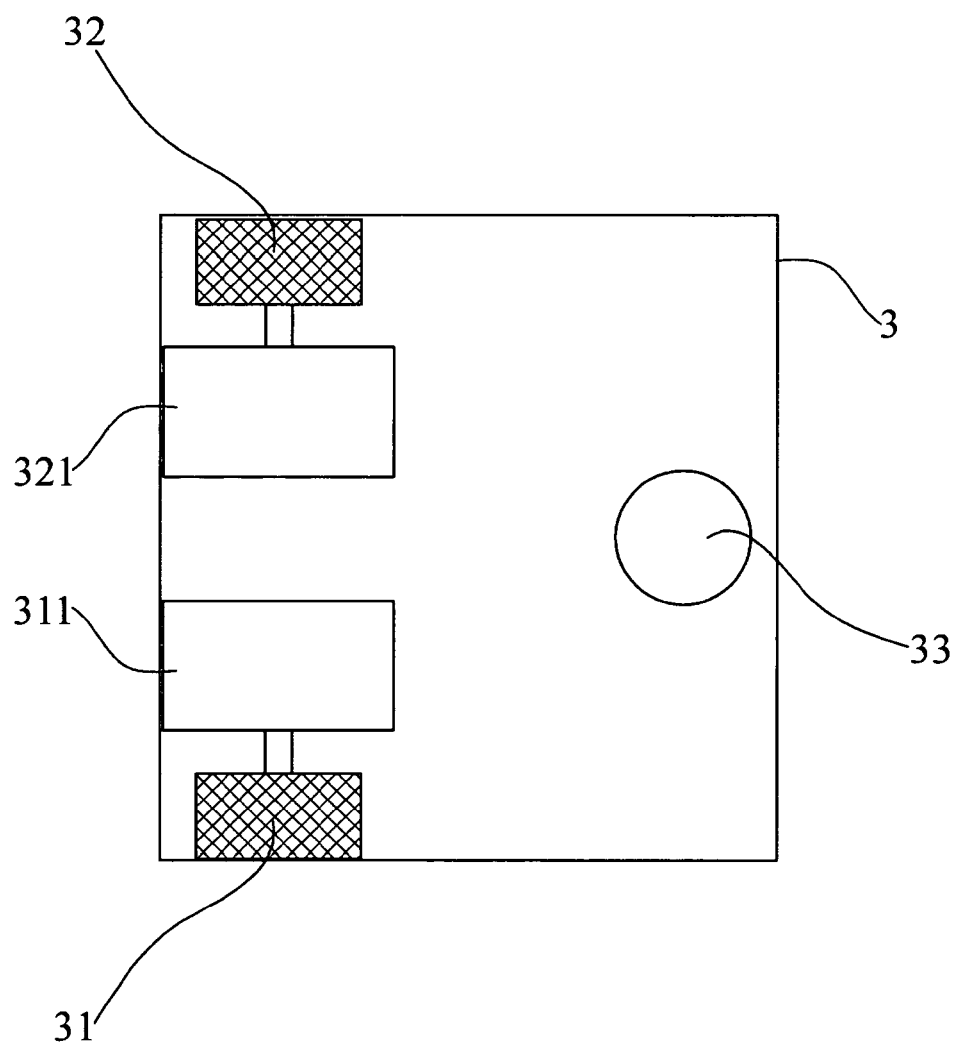


FIG.4

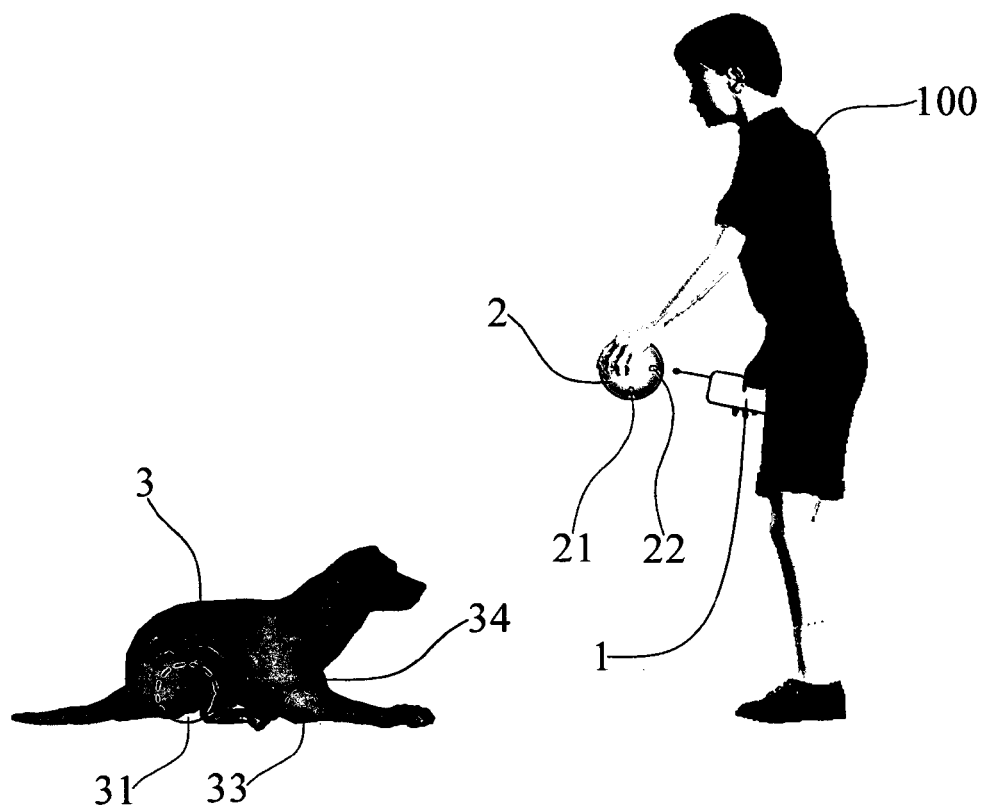


FIG.5

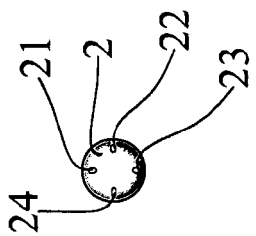
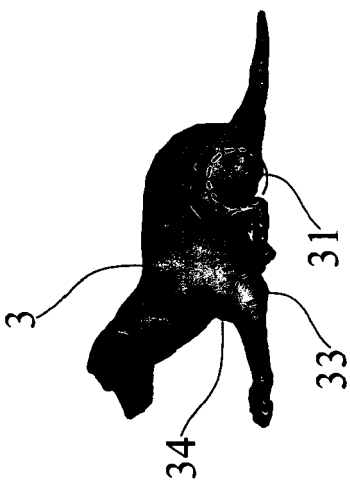
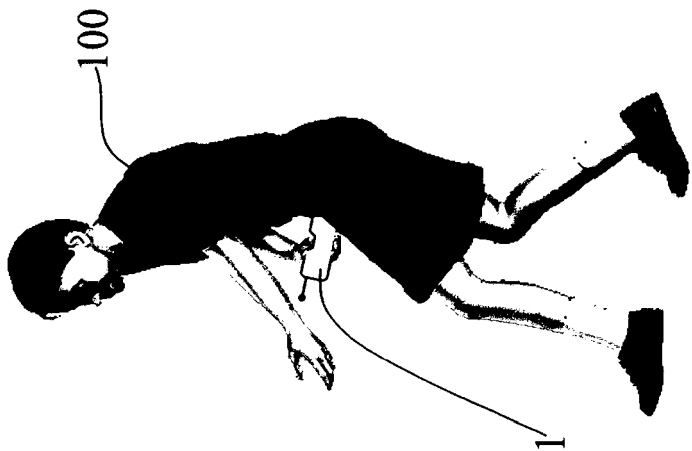


FIG. 6

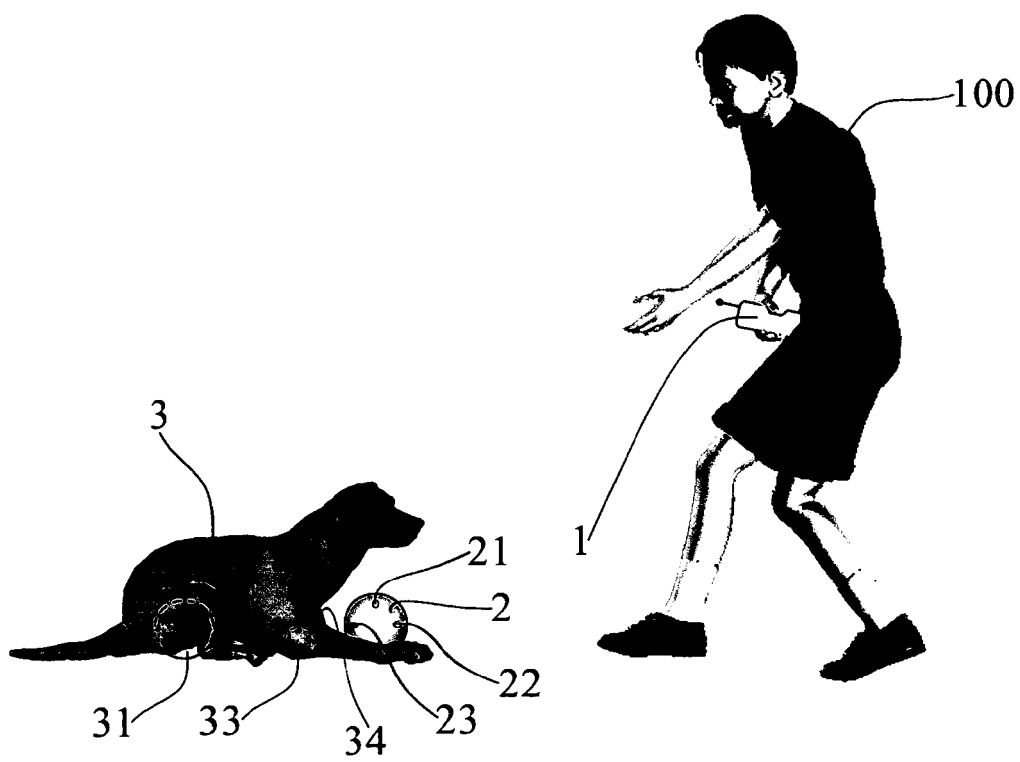


FIG. 7

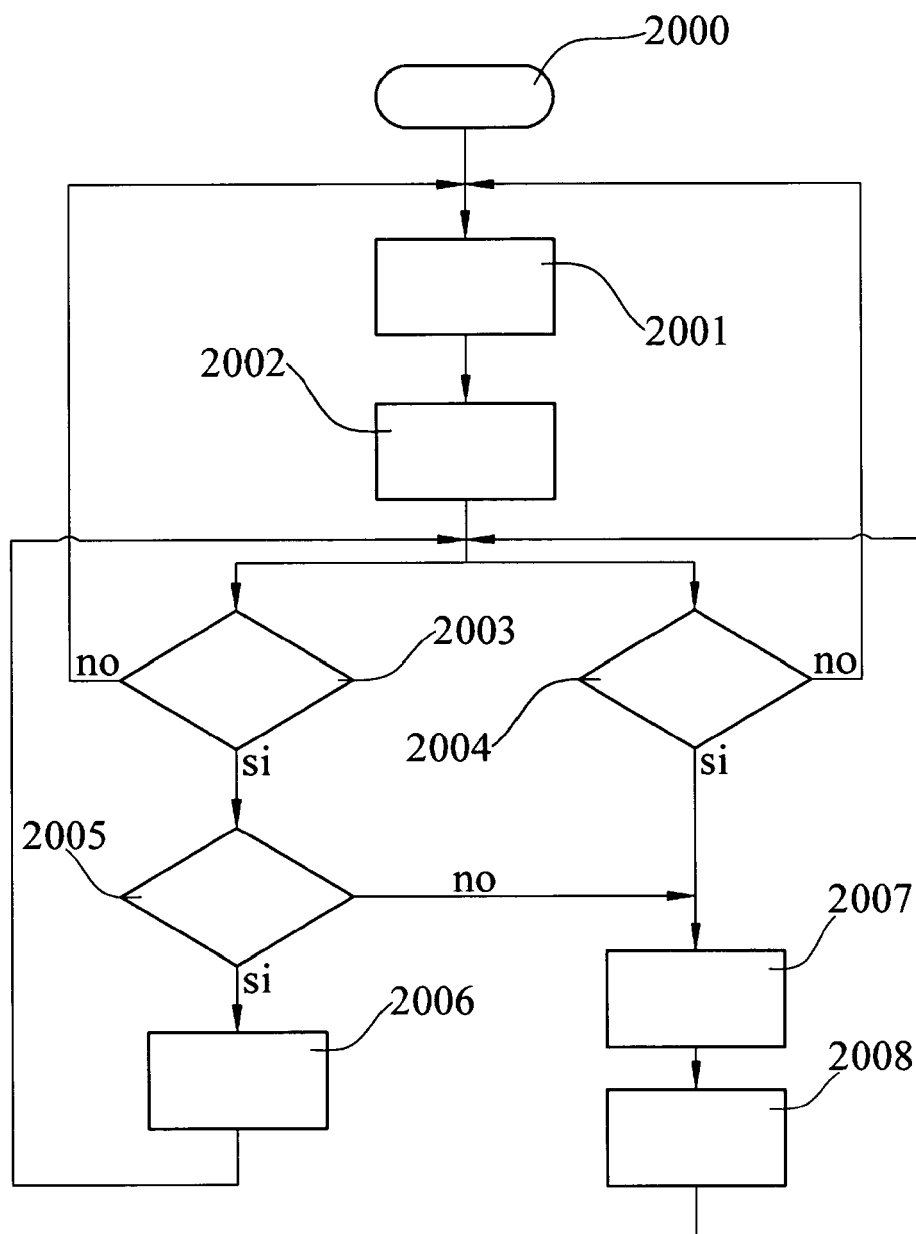


FIG.8



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 38 0296

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 064 976 A (ONILCO INNOVACION SA [ES] ONIL FAB AGRUP DE MUNECA [ES]) 3 January 2001 (2001-01-03) * paragraphs [0001] - [0006], [0028] - [0030]; figures *	1-24	INV. A63H11/00 A63H30/04
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			TECHNICAL FIELDS SEARCHED (IPC)
			A63H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 March 2008	Examiner Lucas, Peter
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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