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(54) **Procedure for the identification, assignation and control of slot track type vehicles**

(57) A procedure for the identification, assignation and control of slot-track type vehicles, characterised in that a console is responsible for sending to the track compound signals in the form of codes which a vehicle is able

to distinguish. Each vehicle continuously emits a characteristic signal which is unique to that vehicle and a number of sensors disposed strategically around the tracks pick up that characteristic and unique signal when the vehicle passes over them.

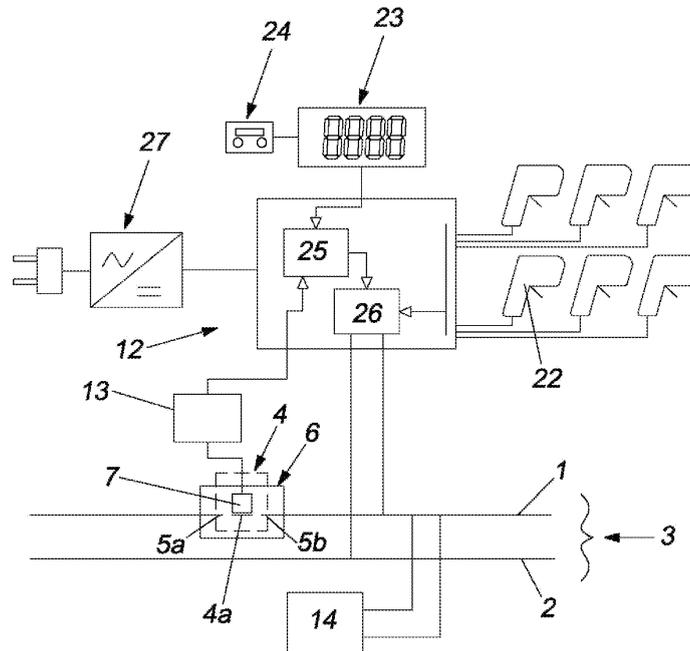


FIG 1

Description

[0001] This invention relates to a procedure for the identification, assignation and control of slot track type vehicles.

5 **BACKGROUND OF THE INVENTION**

[0002] Toys consisting of scale model reproductions of vehicles, which participate in races on tracks provided for that purpose, are currently well known. These tracks are usually reproductions of roads or highways, and are provided with two or more pairs of metallic rails with a slot between them which are disposed in parallel throughout the length of the track. A power source, usually a 220V AC / 12V DC transformer, provides the tracks with voltage. In turn, the vehicles, normally cars or trains, feature a pair of brushes which are at all times in contact with the rails, so that a small direct current electric motor is powered, which causes them to move along the track. Each user may modify the voltage transmitted to the rails on which his/her vehicle runs, thus varying its speed. However, a drawback of this system is that it is not possible for the vehicles to change lanes.

15 **[0003]** In order to solve this problem, a digital system has been developed, based on the inclusion in the vehicles of a device which is capable of recognising control signals which are superimposed on the tracks over the power supply thereof. Thus, each vehicle is able to distinguish the control signals directed thereto, and to react in consequence, for example, switching its lights on or off, changing lanes or modifying its speed. Furthermore, this digital system makes use of a network of sensors disposed on the tracks in order to detect the passage of the vehicles, thus carrying out a two-way communication. However, these sensors have to date not been able to identify a particular vehicle. This problem is resolved by means of the procedure for the identification, assignation and control in accordance with this invention.

DESCRIPTION OF THE INVENTION

25 **[0004]** The procedure for the identification, assignation and control of slot track type vehicles is comprised of a localisation system on vehicle tracks with the added functionality of identification, assignation and control. The localisation system on the tracks of digitally controlled scale model vehicles features a network of sensors suitably distributed throughout the tracks or rails, with the special feature that each sensor is constituted by means of a conductive stretch of a short length which is inserted in one electrode. This stretch is of an appropriate shape for the maintaining of the profile of the electrode and is interconnected thereto by means of a bridge which sandwiches a resistor of a considerable ohmic value.

30 **[0005]** The invention considers the inclusion in each vehicle of a circuit which generates a signal which is suitable for detection by the sensors. Said circuit comprises a branch, in parallel with the normal loads, thanks to the blocking of a circuit comprised of a condenser and a diode (motor, lighting, decoding/regulating circuit) on the vehicle. Thus, each vehicle continuously generates a characteristic signal, constituted of pulses, which is unique to that vehicle.

35 **[0006]** Implemented in the branch is a resistor of an ohmic value which is considerably lower than that of the aforementioned resistor, but at the same time considerably greater than the resistance of the normal loads of the vehicle, in order not to detriment the power to be developed thereby. In series with this second resistor, the branch incorporates a switch operated by a decoding/regulating circuit with which the vehicle is equipped.

40 **[0007]** Transmission from the console to the vehicles is carried out by means of the sending of information to the tracks in the form of pulses, which are superimposed over the vehicle power supply itself. This information is sent by means of a frame wherein the vehicle to which it is directed is identified, and furthermore, comprises information regarding the speed, orders regarding a change of lanes, or the switching on and off of the lights. Thus, each vehicle discerns the information directed towards it, and its decoding/regulating circuit acts as a result.

45 **[0008]** Transmission from the pick-up to the console pulsedly opens and closes the branch switch in accordance with a frequency which is characteristic to the vehicle and with a preset fixed pulse width. In this way, on the passage of the vehicle over the first sensor it finds, a voltage division circuit made of the two resistors in series is closed. Given that the resistance of the sensor is considerably greater than that of the resistance of the signal generating circuit with which the vehicle is provided, at that moment a pulsed variation of the voltage at the sensor is produced, which will constitute the signal of the passage of the vehicle over the position of the sensor.

50 **[0009]** Therefore, in accordance with one aspect of the invention, a procedure for the identification, assignation and control for slot track type vehicles is provided, characterised in that each vehicle continuously emits a characteristic signal which is unique to that vehicle. This unique signal of each vehicle is received by the sensors disposed strategically around the tracks, when the vehicle passes over the sensor. Thanks to these signals, which are transferred to a central microprocessor by the sensor, said microprocessor is able to infer information with regard to the positions of the vehicles on the track, the number of laps, etc, and to display this information on a screen provided for that purpose. Furthermore, the central microprocessor may generate events in accordance with the information received by the sensors, and transmit that information to the users, either through their controls or on a screen, or by transmitting the content of the race in

real time by means of a transmission line.

[0010] In accordance with a preferred embodiment of the invention, some of these events are transmitted to the users by causing a vibration of the controls.

[0011] In accordance with another preferred embodiment of the invention, the characteristic and unique signal emitted by each vehicle is formed by pulses. Thus, in order to distinguish between the signal from one vehicle and that of another, the distance between the trailing edge of one pulse and the leading edge of the next pulse is different for each vehicle. Likewise, a signal which is discriminatory of the deviation activating order is superimposed over the definition of time in which the value of the signal is 1.

[0012] Suitable software integrated into the deviation optimises the activation times of the deviation coil by means of the localisation of the vehicle and, in turn, calculating the time during which the latter will be on the tracking electrode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Figure 1 portrays a general view of a stretch of a circuit.

Figure 2 portrays a detail of a vehicle.

Figure 3 portrays a detail of a lane change-over.

Figure 4 portrays a graph of the pulses emitted by a vehicle at a moment when a change of lane is not requested.

Figure 5 portrays a graph of the pulses emitted by the vehicle in Figure 4 when a change of lane is requested.

DESCRIPTION OF A PRACTICAL EMBODIMENT OF THE INVENTION

[0014] In accordance with a practical embodiment of the invention, a vehicle localisation system is comprised of the following items:

- a screen 23 which displays information with regard to the race, such as times, laps covered by each vehicle 14, etc;
- a keyboard 24 which is used to program the different race modalities and to program the system. It would be possible, for instance, to program a race of a specific number of laps;
- a number of sensors 4 disposed strategically along the tracks, which detect the passage of the vehicle over the same;
- electromechanisms 32 for changing lanes;
- a central microprocessor 25 which coordinates the operation of an auxiliary microprocessor 26 and the data from the sensor 4, managing the operation of the system;
- an auxiliary microprocessor 26, which manages the information sent by the controls 22;
- a 220V AC /12V DC transformer 27;
- a set of controls 22, each of which features a potentiometer for controlling the speed of the vehicle, a push-button to give the order to change lanes, and a vibrator which notifies changes in the state of the vehicle;
- a vehicle 14, whose brushes make contact with the electrodes 1, 2 which form the tracks;
- tracks 3 on which the vehicle moves.

[0015] The system comprises the insertion in the ground electrode 1 of the pair of electrodes 1, 2 which constitute the tracks 3 on which a scale model of a racing vehicle (slot racing) moves, and from which it is powered, of a plurality of sensors constituted by conductive stretches 4a of a short length which are interconnected to the electrode 1 by means of bridges 6 which incorporate a resistor 7 of a considerably high ohmic value; due to this, under normal conditions these stretches are at the same potential as the electrode 1. The stretches 4a feature a profile which is identical to that of the electrode 1 itself in order to minimise the friction or the unwinding of the brushes, and in this example of the invention they are sandwiched in interruptions provided in the electrode 1, exploiting the bridge 6 in order to guarantee the electrical continuity between its open ends 5a, 5b.

[0016] Distributing the sensors 4 along the locations of interest on the tracks, for instance before the lane changes 10 or at the finishing line, a detection network is configured; this informs the central microprocessor 25 of the passage of a particular vehicle over its position.

[0017] Furthermore, each vehicle 14 features a circuit 15 prepared to generate a signal which may be picked up by the sensors 4. Said circuit is comprised of a branch 16 in parallel with the motor 17, the lighting 18 and the decoding/regulating circuit 19 of the vehicle 14. This branch 16 includes a resistor 20 of an ohmic value considerably lower than that of the resistor 7 of the bridge, and also a switch 21 in series operated by the circuit 19.

[0018] Each vehicle continuously generates a different pulsed signal which is unique to that vehicle. Said signal is formed by pulses with a distance D between the trailing edge and the leading edge which is characteristic of the vehicle 14, as may be observed in Figure 4. In this case, the distance D between the trailing edge and the leading edge for each

vehicle 14 might be:

- Vehicle 1 = 0.5 msec
- Vehicle 2 = 1.0 msec
- 5 Vehicle 3 = 1.5 msec
- Vehicle 4 = 2.0 msec
- Vehicle 5 = 2.5 msec
- Vehicle 6 = 3.0 msec
- Vehicle 7 = 3.5 msec
- 10 Vehicle 8 = 4.0 msec

[0019] In this way, when the vehicle 14 passes over the sensor 4, the voltage divider circuit constituted by the resistors 7 and 20 in series closes; this brings about a pulsed variation of the normal voltage of the stretch 4a which is detected by the sensor 4. Thus, the central microprocessor 25 is aware of which vehicle 14 is passing over each sensor 4 at all times, and may act on the system in consequence, for instance counting the laps of each vehicle 14 and displaying them on the screen 23.

[0020] Furthermore, this procedure allows the users to be informed of particular events occurring in the race, in this example by means of the vibration of one of the controls, for instance, when the corresponding vehicle 14 is on its last lap.

[0021] It is also possible for a user, by means of his/her control 22, to order the change of lane of a particular vehicle 14. In this case, the auxiliary microprocessor 26 injects the corresponding command, which includes the identifier of the particular vehicle 14, by means of pulse modulation, to the electrodes 1, 2 of the lanes.

[0022] In this example, the frame sent by the auxiliary microprocessor 26 to the electrodes (conductive tracks) 1, 2 is composed of the following fields:

VARIOUS				PARITY				SPEED				DIRECTION			
X2	X1	DIVERT	LIGHT	8	4	2	1	8	4	2	1	8	4	2	1

[0023] The first word of the frame encodes the address to which the information is directed, i.e., the channel. There are 8 channels available for 8 different vehicles, the remainder of the channels being used for other purposes, such as counters or for the identification of the vehicle 14. The second word encodes the speed that the user wants to give to the corresponding vehicle. The third word contains parity bits in order to prevent errors in the transmission. In this example, DIRECTION + SPEED + VARIOUS = PARITY. Finally, the last word encodes the lane change and the lighting signals, two bits remaining spare for other possible signals.

[0024] In order to assign a car to a channel the code zero will be used, and the number of the new channel will be transmitted to the speed field.

[0025] Thus, the previous frame is interpreted by the decoding/regulating circuit 19, which pulsedly closes the switch 21 with the distance between the trailing edge and the leading edge corresponding to said vehicle 14, but with a pulse width double that of the one corresponding to the vehicle in its normal state. This may be observed in Figures 4 and 5, where the pulsed signal emitted by a vehicle 14 is portrayed under normal conditions (Figure 4) and when a change of lane is requested (Figure 5). The central microprocessor 25 interprets this double pulse width as an order to change lanes when the vehicle passes through the next lane change electromechanism 32.

[0026] Furthermore, the sensor 4 features a time measuring system which calculates, when a lane change is ordered, the moment at which a particular vehicle 14 will pass through the location at which the lane change electromechanism 32 is installed, in accordance with the speed of the vehicle. Thus, the operation of the electromechanism 32 is synchronised with the exact moment where at the vehicle 14 passes through the same. In this example, the lane change electromechanism 32 is located 10mm behind the sensor 4.

[0027] The circuit is completed with the insertion of a condenser 23 in parallel with the normal loads of the vehicle (motor, lighting and circuit); this condenser 23 stores energy in order to supply the same to these elements during the brief time lapse which occurs on passing over the sensor, a diode 24 preventing the discharge of the condenser through the sensor.

The nature of the invention having been sufficiently disclosed, likewise the practical embodiment thereof, it must be stated that the arrangements indicated above and portrayed in the attached drawings are susceptible to modifications in detail in so far as they do not alter the fundamental concept thereof.

Claims

1. A procedure for the identification, assignation and control of slot-track type vehicles, **characterised in that**

- a) a console is responsible for sending to the track compound signals in the form of codes which a vehicle is able to distinguish.
- b) each vehicle continuously emits a characteristic signal which is unique to that vehicle;
- c) a number of sensors disposed strategically around the tracks pick up that characteristic and unique signal when the vehicle passes over them.

2. A procedure according to claim 1, where the sensor also transmits information regarding the positions of the vehicles on the track to a central microprocessor.

3. A procedure according to either of the preceding claims, where the central microprocessor also generates events according to the information received by the sensors.

4. A procedure according to any of the preceding claims, where the central microprocessor also transmits information regarding events to the users via their controls or a screen, or transmits the content of the race in real time by means of a transmission line.

5. A procedure according to any of the preceding claims, where one or several events are transmitted to the users by means of the vibration of their controls.

6. A procedure according to any of the preceding claims, where the signal emitted by the vehicles is also formed by pulses.

7. A procedure according to any of the preceding claims, where the signal emitted by each vehicle is **characterised by** the distance between the trailing edge and the next leading edge of the pulses.

8. A procedure according to any of the preceding claims, where there exists a procedure for the assignation to each vehicle of a unique distance between the trailing edge and the next leading edge of the pulses.

9. A procedure according to any of the preceding claims, where a lane change comprises the following operations:

- a. on activating the corresponding push-button at the control, the order is sent to the central microprocessor;
- b. the central microprocessor sends a lane change order, superimposed over the track power supply, to a particular vehicle;
- c. the vehicle detects the lane change order and doubles the pulse width of the signal which it emits;
- d. the sensor detects a double pulse width in the signal emitted by a vehicle and calculates, by means of the speed of the vehicle, the moment at which said vehicle will pass through the next electromechanical lane change device;
- e. the sensor activates the lane change electromechanism at the appropriate time, causing the vehicle to change lanes.

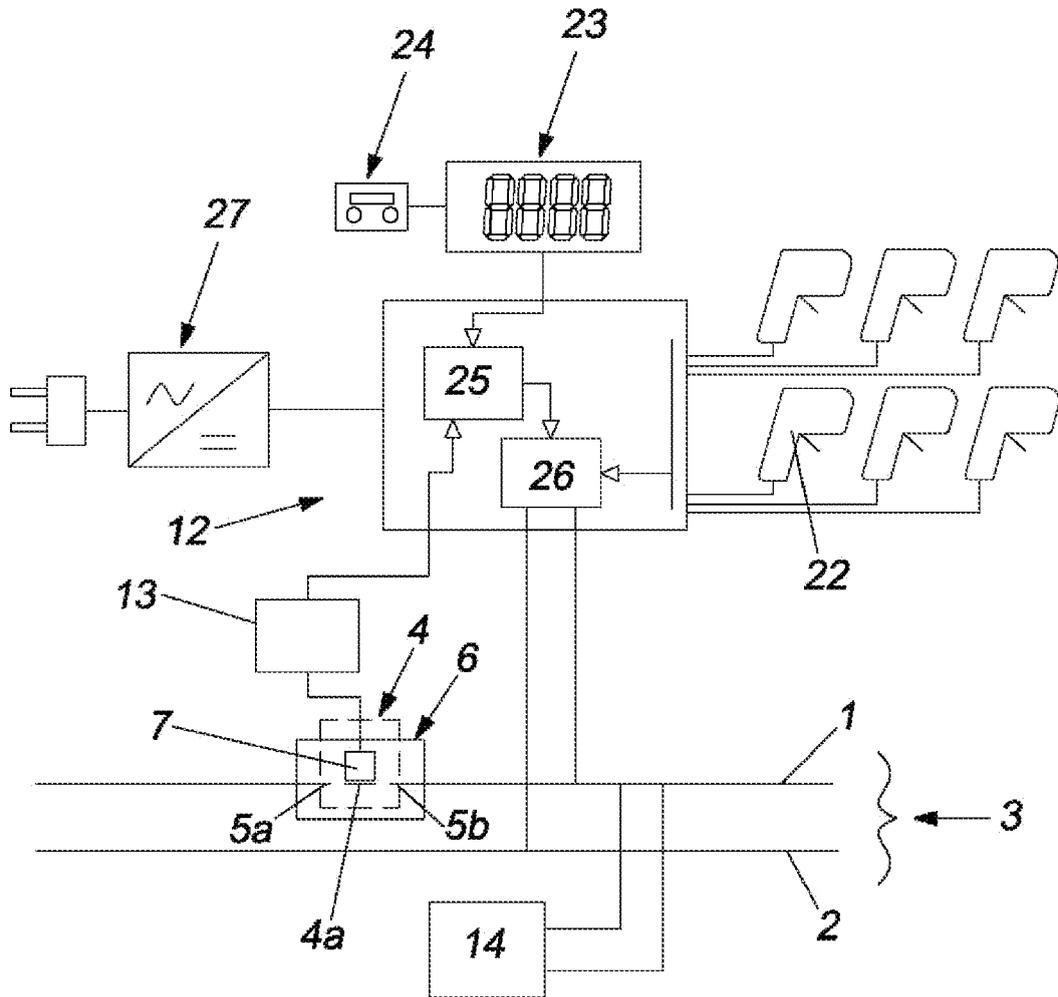


FIG 1

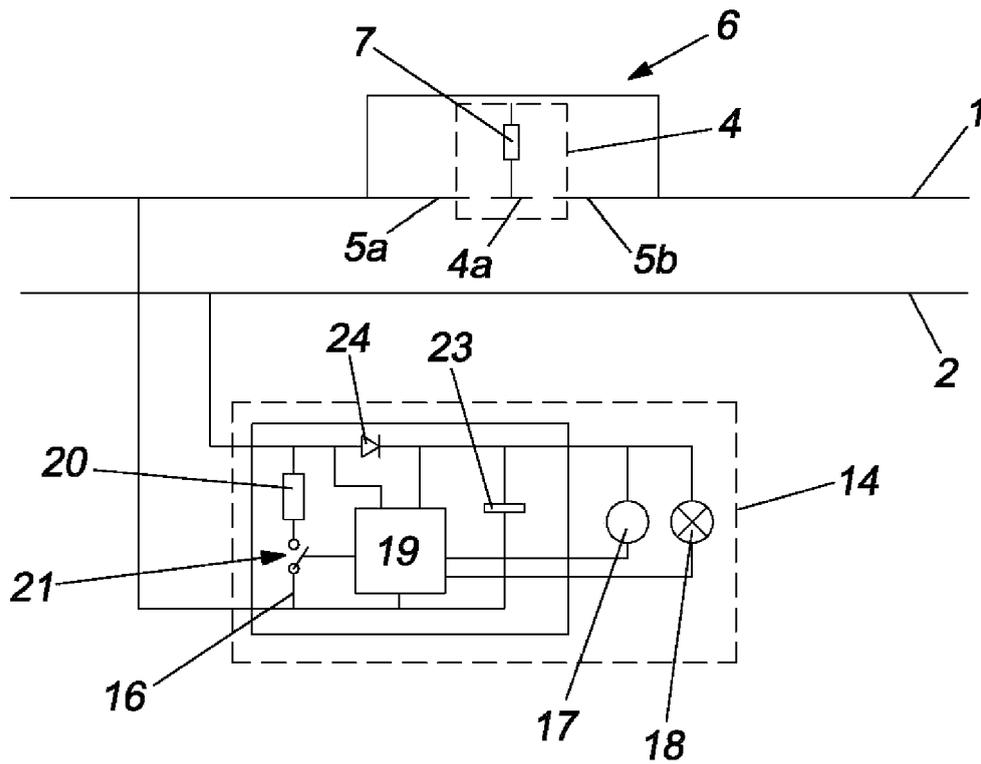


FIG 2

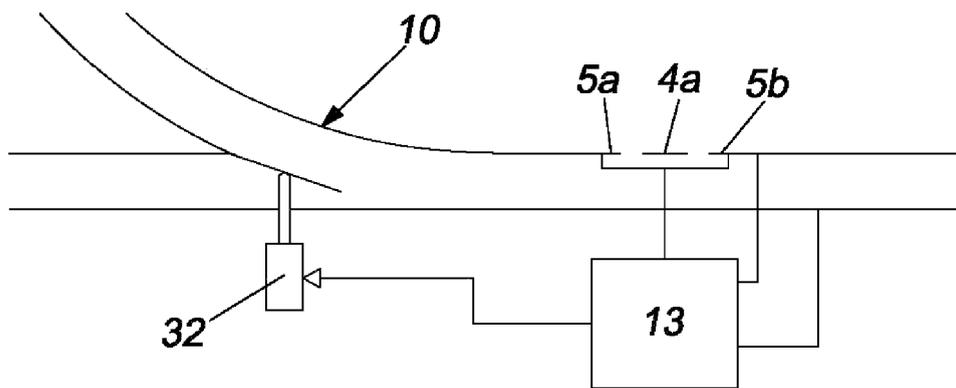


FIG 3

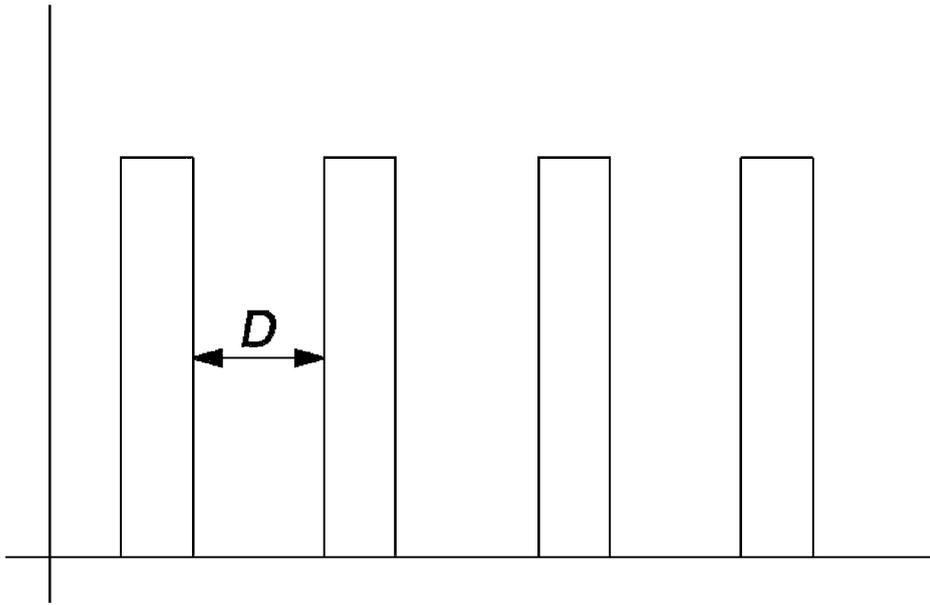


FIG 4

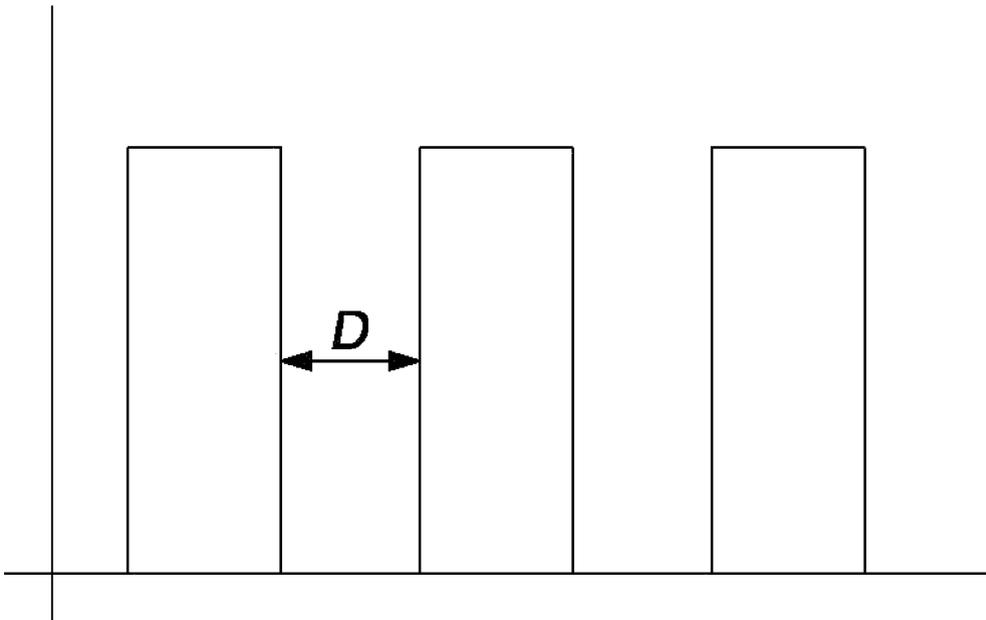


FIG 5



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2005/053806 A (MATTEL INC [US]; SANCHEZ-CASTRO JORGE [US]; GRZESEK ROBERT [US]; AMIRE) 16 June 2005 (2005-06-16) * paragraphs [0004] - [0006]; figures * -----	1-9	INV. A63H18/02 A63H18/16
P,X	EP 1 806 166 A (NINCO DESARROLLOS SL [ES]) 11 July 2007 (2007-07-11) * paragraphs [0014] - [0018], [0020] - [0023]; figures * -----	1,6-9	
A	US 5 085 148 A (KONNO SUNAO [JP]) 4 February 1992 (1992-02-04) * column 1, line 47 - column 2, line 25 * -----	1	
A	US 5 749 547 A (YOUNG NEIL P [US] ET AL) 12 May 1998 (1998-05-12) * column 2, line 20 - line 56 * -----	1	
			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 25 June 2008	Examiner Lucas, Peter
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 08 10 2131

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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25-06-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2005053806	A	16-06-2005	CA 2545741 A1	16-06-2005
			EP 1706184 A2	04-10-2006
			US 2005148281 A1	07-07-2005

EP 1806166	A	11-07-2007	AT 396779 T	15-06-2008
			ES 2288101 A1	16-12-2007

US 5085148	A	04-02-1992	GB 2235137 A	27-02-1991
			JP 3039099 U	16-04-1991
			JP 8010345 Y2	29-03-1996

US 5749547	A	12-05-1998	NONE	
