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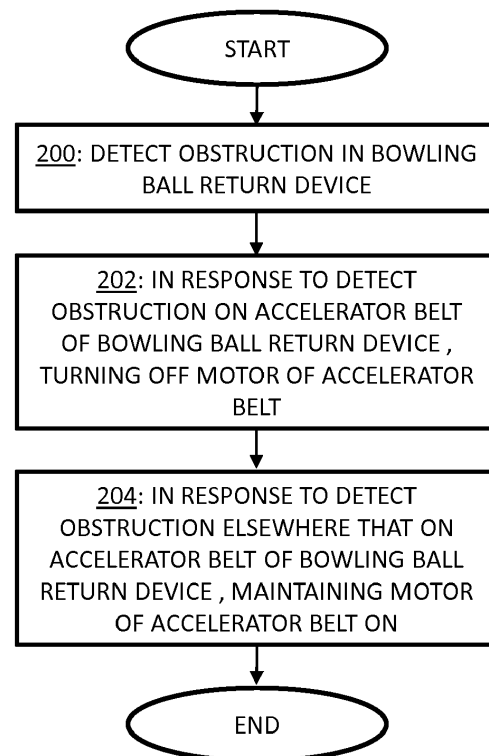
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(54) **METHOD AND SYSTEM FOR CONTROLLING BOWLING BALL RETURN DEVICE**

(57) A method for controlling a bowling ball return device, comprising: detecting, by using one or more sensors, an obstruction in the bowling ball return device; in response to detecting the obstruction on an accelerator belt of the bowling ball return device, turning off a motor of the accelerator belt of the bowling ball return device; and in response to detecting the obstruction elsewhere than on the accelerator belt of the bowling ball return device, maintaining the motor of the accelerator belt of the bowling ball return device on.



**FIG. 2**

## Description

### FIELD OF THE INVENTION

**[0001]** The invention relates to a bowling ball return device, and more particularly to a solution for controlling the bowling ball return device.

### BACKGROUND OF THE INVENTION

**[0002]** The bowling ball return device is used for returning a bowling ball back to the player(s) after throwing. The bowling ball return device comprise a member like, for example, an accelerator belt to provide a force for returning the ball. The bowling ball return device is coupled with a bowling lane(s) and hence, a bowling pin may sometimes end up in the bowling ball return device. The pin usually causes an obstruction in the bowling ball return device and, if the obstruction is, for example, on the accelerator belt, the bowling ball may be damaged. Hence, the accelerator belt is normally stopped when the obstruction occurs in the bowling ball return device. When the accelerator belt is stopped, bowling in the bowling lane(s) coupled with the bowling ball return device is also stopped.

### BRIEF DESCRIPTION OF THE INVENTION

**[0003]** The invention is defined by the independent claims.

**[0004]** Embodiments of the invention are defined in the dependent claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0005]** In the following the invention will be described in greater detail by means of preferred embodiments with reference to the attached drawings, in which

Figure 1 illustrates a general simplified architecture of a bowling ball return device coupled with bowling lanes;

Figure 2 illustrates a flow diagram of a process for controlling of the bowling ball return device;

Figure 3 illustrates the bowling ball return device according to an embodiment; and

Figure 4 illustrates a system for controlling the bowling ball return device.

### DETAILED DESCRIPTION OF THE INVENTION

**[0006]** The following embodiments are only examples. Although the specification may refer to "an" embodiment in several locations, this does not necessarily mean that each such reference is to the same embodiment(s), or that the feature only applies to a single embodiment. Single features of different embodiments may also be combined to provide other embodiments. Furthermore, words

"comprising" and "including" should be understood as not limiting the described embodiments to consist of only those features that have been mentioned and such embodiments may contain also features/structures that have not been specifically mentioned.

**[0007]** As described in Background, the pin may cause the obstruction in the bowling ball return device. The obstruction may occur in various places of the bowling ball return device, and it may cause more problems in some places than in other places. The most problematic place for the obstruction is the accelerator belt that provides a bowling ball with a force for returning the bowling ball. Friction caused by a rotating belt may damage the bowling ball, if the ball is stuck on the belt. It may even render the ball unusable. Conventionally, the accelerator belt is turned off when the obstruction is detected in the bowling ball return device to avoid the bowling ball damages. Sometimes, the obstruction is not on the accelerator belt and, in such a case, the belt may be turned off unnecessarily. Unnecessary stoppings of the accelerator belt may disturb bowling in bowling lanes coupled with the bowling ball returning device and may also cause extra work for operators of a bowling alley. Hence, unnecessary stops of the accelerator belt should be avoided.

**[0008]** The present invention provides a sophisticated solution for controlling the bowling ball return device and its accelerator belt in case, wherein the obstruction occurs in the bowling ball return device.

**[0009]** Figure 1 illustrates a general simplified architecture of a bowling ball return device 100 coupled with bowling lanes, in which embodiments of the invention may be applied. The bowling ball return device may comprise an accelerator belt 102, a first ball door 104, a second ball door 106, a first bowling ball rail 108, a second bowling ball rail 110 and one or more sensors 112a, 112b, 112c. The bowling ball return device may be coupled with one or more bowling lanes 114, 124 via one or more ball entrances 116, 118.

**[0010]** A bowling ball 120a, 120b, when thrown, travels along a bowling lane and hits pins 122a, 122b that are in an array at the end of the bowling lane 114, 124. After hitting the pins 122a, 122b, the bowling ball 120a, 120b is guided toward a ball entrance 116, 118. Ball doors 104, 106 are positioned at the ball entrances 116, 118. The ball door 104, 106 opens when the bowling ball 120a, 120b reaches the ball entrance 116, 118 and let the bowling ball 120a, 120b in the bowling ball return device 100. The bowling ball 120a, 120b is guided, by a first bowling ball rail 108, toward the accelerator belt 102. The accelerator belt 102 provides the bowling ball 120a, 120b with a force for travelling back to the player via a second bowling ball rail 110. The bowling ball 120a, 120b may travel from the bowling lane 114, 124 toward the accelerator belt 102 by gravity, or there may be a mechanism that provides the bowling ball 120a, 120b with a moving force. In some case, both solutions may be applied. Arrows D1 present a direction of the movement of the bowling ball in the bowling ball return device.

**[0011]** Sometimes, the pin 122a, 122b may also enter the bowling ball return device 100 through the ball entrance 118, 120 when the ball door 104, 106 is open. The pin 122a, 122b, inside the bowling ball return device, may cause the obstruction which prevents the movement of the bowling ball 120a, 120b and the bowling ball 120a, 120b cannot be returned back to the player due to the obstruction. As described earlier, the obstruction may occur in various places of the bowling ball return device such as, for example, in the bowling ball entrance 116, 118 area, in the ball rail 108, 110 or on the accelerator belt 102.

**[0012]** Figure 2 illustrates a flow diagram of a process for controlling of a bowling ball return device according to an embodiment. Referring to Figure 2, the process comprises: (block 200) detecting, by using one or more sensors, an obstruction in the bowling ball return device; (block 202) in response to detecting the obstruction on an accelerator belt of the bowling ball return device, turning off a motor of the accelerator belt of the bowling ball return device; and (block 204) in response to detecting the obstruction elsewhere than on the accelerator belt of the bowling ball return device, maintaining the motor of the accelerator belt on.

**[0013]** Referring to block 200, the obstruction is detected by the one or more sensors placed in the bowling ball return device. The one or more sensors may be capable of detecting the obstruction in various places of the bowling ball return device. In an embodiment, the one or more sensors may also detect the obstruction outside of the bowling ball return device, for example, at the ball entrances and/or the ball doors on either or both sides of the ball doors. Sometimes, the obstruction may occur before the bowling ball travels through the ball entrance into the bowling ball return device and, hence, the obstruction may be on the bowling lane side of the ball entrance and prevent the movement of the bowling ball inside the bowling ball return device.

**[0014]** The sensors have an operation range in which the sensor is capable of detecting the obstruction. The one or more sensors may be located in the bowling ball return device such that the operation range covers all possible areas wherein the obstruction may occur. The one or more sensors may locate, for example, nearby the ball entrance(s) or accelerator belt and the one or more sensors may be directed such that the operation range of the one or more sensors covers these areas.

**[0015]** In an embodiment, the obstruction is detected, for example, such that the bowling ball stops, for example because of the pin, at an operation range of the sensor and the sensor detects that the bowling ball does not move. When the ball is detected as being stopped for a predetermined time, the sensor may generate a signal about the obstruction detection. A separate counter may also be used with the sensors for measuring the predetermined time. The one or more sensors may comprise any type of a component which is able to detect the obstruction, also different type of the sensors may be com-

bined to achieve the desired solution. The one or more sensors may comprise proximity sensor, electrical sensor, magnetic sensor, pressure sensor, optical sensor, audio sensor, light sensor, infrared sensor, for example.

**[0016]** Referring to block 202, if the obstruction is detected on the accelerator belt of the bowling ball return device, a motor of the accelerator belt is turned off. In an embodiment, the accelerator belt is not necessarily a belt, it may be some other component and/or mechanism, e. g. a wheel capable of providing a force for the bowling ball to return back to the start of the bowling lane. In an embodiment, the accelerator belt is provided with a power source such as the motor which rotates the belt.

**[0017]** When the obstruction is detected on the belt, the bowling ball is in contact with the rotating belt but cannot move forward and hence, the contact with the rotating belt may cause damages to the bowling ball. A term "on the accelerator belt" means that the obstruction may be anywhere nearby the belt such that the belt is in contact with the bowling ball and/or pin and may cause damages to the ball and/or pin. Hence, the term "on the accelerator belt" may not mean that obstruction is necessarily exactly on the top of the belt.

**[0018]** If the obstruction is detected on the accelerator belt, the motor of the belt may be turned off to stop the belt and avoid the damages to the bowling ball and/or structures of the bowling ball return device. In an embodiment, the sensor may detect that the bowling ball is stopped on the accelerator belt and when the ball has been in the stopped state for predetermined time, for example some seconds, the sensor generates a signal which turns off the motor of the accelerator belt and stops the belt. Hence, the damages in the bowling ball may be avoided. The operator of the bowling alley may turn on the motor again, when the obstruction is removed. In an embodiment, the motor may be turned on automatically after predetermined time, if the sensor detects that the obstruction does not occur anymore. There may be, for example, an alarm sound or light that indicates to the operator that the motor of the belt is going to be turned on again and the belt starts to rotate.

**[0019]** Referring to block 204, if the obstruction is detected elsewhere than on the accelerator belt of the bowling ball return device, a motor of the accelerator belt is maintained on. As described earlier, the obstruction may occur anywhere in the bowling ball return device, not only on the accelerator belt. If the obstruction is detected elsewhere than on the accelerator belt, there is no reason to turn off the motor of the accelerator belt and stop the belt. Unnecessary stopping of the belt stresses the motor of the accelerator belt and may also disturb operations of the whole bowling alley. It may also cause unnecessary extra work for the operators of the bowling alley.

**[0020]** In an embodiment, the bowling ball return device may be coupled with two bowling lanes and when the accelerator belt of the bowling ball return device is unnecessarily stopped, the players on the both bowling lanes cannot get their bowling balls back. Still, the ob-

struction may locate on the place where it may not affect the other bowling lane at all and hence, the bowling on the other lane would continue normally if the accelerator belt is maintained on. Hence, it does not make sense to turn off the motor of the accelerator belt and stop the belt, if the obstruction is in the place of the ball return device in which the obstruction may not disturb bowling in the other bowling lane.

**[0021]** As described above, the invention provides a smart solution which is capable of detecting the obstruction anywhere in the bowling ball return device and turn off the motor of the accelerator belt only if the obstruction is on the belt to avoid the bowling ball damages. With the solution according to the invention, the unnecessary stops of the accelerator belt and all extra work caused by the stops may be avoided. This enhance operations of the whole bowling alley.

**[0022]** In an embodiment, said elsewhere (block 204) refers to the first ball entrance of the first bowling lane or the second ball entrance of the second bowling lane. As described, the bowling ball return device is coupled with the first bowling lane via the first ball entrance and with the second bowling lane via the second ball entrance. The ball entrances may comprise the ball doors. The bowling ball goes through the ball entrance when entering into the bowling ball return device. The ball entrance should be understood as an area around the ball entrance and hence, it is not only the point where from the bowling ball enters the bowling ball return device, in other words, the location of the ball door. The ball entrance area may start from the bowling lane side of the ball door, in other words, from outside of the ball entrance of the ball return device and may extend up to the point from which the accelerator belt starts. The accelerator belt may not be included in the bowling ball entrance area.

**[0023]** In an embodiment, the ball entrance may start, for example, from the outside of the first ball entrance of the bowling ball return device and extend inside the device such that it ends at a point of the first ball rail where a bowling ball from the second ball entrance may still move onto the accelerator belt although there is the obstruction in the first ball entrance area. Referring to Figure 3, the obstruction is caused by the pin 122a in the first ball entrance area 116 and the obstruction blocks the movement of the first bowling ball 120a, in other words, the ball cannot move to the accelerator belt 102. Still, there is space enough for the second bowling ball 120b, coming from the second ball entrance 118, to move onto the accelerator belt 102 despite the obstruction in the first ball entrance area 116. In this case, there is no sense to stop the accelerator belt because the bowling ball from the second bowling lane can still go to the belt and can be returned for the player. Hence, the first ball entrance may be understood as an area that ends in the point of the first ball rail in which the bowling ball from the second ball entrance can still move onto the accelerator belt despite the obstruction in the first ball entrance area.

**[0024]** In an embodiment, the one or more sensors are

positioned to detect the obstruction in the first ball entrance, the second ball entrance and on the accelerator belt of the bowling ball return device. Referring to Figure 3, the one or more sensors 112a, 112b, 112c may be positioned such that they are capable of detecting the obstruction in the first ball entrance 116, in the second ball entrance 118 and on the accelerator belt 102. The one or more sensors 112a, 112b, 112c may also be able to detect the obstruction in the second ball rail 110, which may locate behind the accelerator belt 102 as well as in the front of the ball door outside of the bowling ball return device. In an embodiment, a plurality of sensor may be placed around the bowling ball return device to detect the obstruction. Some of the sensors or all sensors may be located outside the bowling ball return device, for example, in the bowling lanes coupled with the bowling ball return device. In another embodiment, only one sensor is used to detect the obstruction anywhere in the bowling ball return device. The sensor may be placed, for example, inside the bowling ball return device such that the operation range of the sensor covers the first ball entrance, the second ball entrance and the accelerator belt. Hence, the one sensor may be used to detect the obstruction inside the bowling ball return device. Also the second ball rail may be covered by the one sensor.

**[0025]** In an embodiment, a first sensor is positioned to detect the obstruction in the first ball entrance, a second sensor is positioned to detect the obstruction in the second ball entrance and a third sensor is positioned to detect the obstruction on the accelerator belt of the bowling ball return device. Referring to Figure 1, the first sensor 112a detects the obstruction in the first ball entrance 116, the second sensor 112b detects the obstruction in the second ball entrance 118 and the third sensor 112c detects the obstruction on the accelerator belt 102. The first and the second sensors 112a, 112b may also be able to detect the obstructions in the front of the ball door outside the bowling ball return device, in other words, on the bowling lane in the front of the ball door. The third sensor 112c may also be able to detect the obstruction in the second ball rail 110, behind the accelerator belt 102.

**[0026]** In an embodiment, the first and the second bowling lanes, coupled with the bowling ball return device, are closed when the one or more sensors detect the obstruction on the accelerator belt. The accelerator belt is stopped if the obstruction is on the accelerator belt and hence, the bowling balls may not be returned. The first and the second bowling lanes are closed in order to prevent moving of the bowling balls into the bowling ball return device when the accelerator belt is not running due to the obstruction. If more bowling balls are thrown to the bowling lane, the obstruction may get worse, because more bowling balls may gather to the obstruction. The first and the second bowling lanes may also be stopped if the obstruction is in the second ball rail.

**[0027]** In an embodiment, the first bowling lane is closed when the one or more sensors detect the obstruction

tion in the first ball entrance. The first bowling lane is closed to prevent throwing of the bowling balls into the bowling ball return device which may get the obstruction worse. As described earlier, the obstruction in the first ball entrance may not affect the movement of the bowling ball from the second ball entrance to the accelerator belt and therefore, the second bowling lane may not be closed when the obstruction is in the first ball entrance.

**[0028]** In an embodiment, the second bowling lane is closed when the one or more sensors detect the obstruction in the second ball entrance. The second bowling lane is closed to prevent throwing of the bowling balls into the bowling ball return device which may get the obstruction worse. As described earlier, the obstruction in the second ball entrance may not affect the movement of the bowling ball from the first ball entrance to the accelerator belt and therefore, the first bowling lane may not be closed when the obstruction is in the second ball entrance.

**[0029]** In an embodiment, wherein the first and/or second bowling lane is closed, a boom of the bowling lane may be laid down. When the boom is down the players see that the lane is closed and it is not allowed to throw the bowling balls to the lane.

**[0030]** In an embodiment, the one or more sensors are positioned to detect a state of ball doors of the ball return device, in other words, whether the ball door open or closed. The one or more sensors may be placed, for example above the door(s) such that the door in the open state is in the operation range of the sensor and when the door is in the range for predetermined time the sensor generates the detection signal. For example, the ball door may be open and cannot be closed because of the obstruction in the ball door area. Then, the one or more sensors may detect that the door is in the open state and hence, detects the obstruction. The one or more sensors may detect that the door is in the open state for predetermined time and then generates the detection signal. In an embodiment, the one or more sensors may also detect if the door cannot be opened because of the obstruction and hence, generates a detection signal. The one or more sensors detecting the state of the door(s) may also be used to detect a malfunction of the doors.

**[0031]** In an embodiment, the one or more sensors are able to recognize the pin in the bowling ball return device. The one or more sensors may recognize the pin when the obstruction occurs or even before the obstruction. For example, the one or more sensors may detect the pin immediately when entered into the bowling ball return device before the pin causes the obstruction. The obstruction may then be avoided beforehand, if the pin is removed before the possible obstruction in the bowling ball return device. The one or more sensors may be carried out, for example, as a machine vision or photocell which is capable to recognize objects, in this case the pins, in the system. The machine vision or photocell may also be capable to detect wherein the pin or obstruction is in the bowling ball return device.

**[0032]** In an embodiment, an alarm is generated when

the obstruction is detected in the bowling ball return device. The alarm may be generated immediately when the obstruction is detected on the accelerator belt or elsewhere in the bowling ball return device. The purpose of the alarm is to inform the operator of the bowling alley about the obstruction and possible stopping of the accelerator belt. The alarm may be, for example, an alarm sound and/or light.

**[0033]** In an embodiment, the alarm may be shown in a control unit of the bowling ball return device. The control unit of the bowling ball return device may be a part of the control unit of the whole bowling system which usually comprise a display. The control unit may be located, for example, near by the cash desk wherein the operator usually is when serving customers. Hence, when the alarm is shown in the control unit, the operator can easily notice the obstruction in the bowling ball return device and start the corrective actions as soon as possible.

**[0034]** In an embodiment, the alarm shown in the control unit of the bowling ball return device may comprise information about the obstruction. The information may comprise, for example, a location of the obstruction in the bowling alley and in the bowling ball return device, a notification if the motor of the accelerator belt is turned on/off, a notification if the obstruction leaves away before any corrective actions, and possible corrective actions for the operators what should be done when the obstruction is detected.

**[0035]** In an embodiment, the accelerator belt starts to rotate when the bowling ball approaches the the accelerator belt, in other words, the belt may not necessarily rotate all the time if there is no bowling ball in the bowling ball return device. The motor of the accelerator belt may be turned on, for example, when the bowling ball enters the bowling ball return device. In case, when the obstruction occurs in the bowling ball return device, the motor of the accelerator belt may not be turned on. The one or more sensors may detect the obstruction and generate a signal to maintain the motor of the accelerator belt off. In another embodiment, the motor of the accelerator belt is turned on if the obstruction occurs, for example, at the first ball entrance and the bowling ball from the second ball entrance travels to the accelerator belt. The one or more sensors may detect the obstruction at the first ball entrance and also detect that the bowling ball from the second ball entrance come into the bowling ball return device. Then the motor of the accelerator belt may be turned on although there is the obstruction in the first ball entrance because there may be enough space for the bowling ball from the second ball entrance to travel to the accelerator belt.

**[0036]** Following example describes how the method of controlling the bowling ball return device may be applied in the bowling alley. The player throws the bowling ball to the bowling lane and the ball, after hitting the pins, travels toward the ball entrance of the bowling ball return device. When the ball door is open for the bowling ball, the pin may also enter inside the bowling ball return de-

vice which may lead to the obstruction. The obstruction may be, for example, near by the ball entrance area or on the accelerator belt of the bowling ball return device. The one or more sensors may detect the obstruction in the bowling ball return device and the sensors may also be capable to detect the location of the obstruction inside the device. When the obstruction is detected, an alarm is generated to inform operators of the bowling alley about the issue. If the obstruction is on the accelerator belt or near by the accelerator belt such that the rotating belt is in contact with the bowling ball and/or pin, the motor of the accelerator belt is turned off and the accelerator belt is stopped. The accelerator belt is stopped to avoid damages in the bowling ball and/or pin. If the obstruction is elsewhere than on the accelerator belt, for example in the ball entrance area, the belt is not turned off because the rotating belt is not in contact with the bowling ball and/or pin.

**[0037]** The bowling ball return device may be coupled with two bowling lanes and when the accelerator belt is stopped, bowling on the both lanes stops because the bowling balls cannot be returned. In case, wherein the obstruction is, for example, in the ball entrance area of the first bowling lane, the obstruction may not affect the bowling on the second bowling lane at all. In other words, the balls from the second bowling lane can enter the accelerator belt nevertheless there is the obstruction in the ball entrance of the first bowling lane. Hence, it does not make sense to stop the accelerator belt and stop the bowling on the second bowling lane. The method according to the invention provides a sophisticated solution for controlling the bowling ball return device such that the accelerator belt is stopped only when it really is necessary and hence, the unnecessary stops may be avoided.

**[0038]** Figure 4 illustrates a system 400 for controlling a bowling ball return device according to an embodiment. Referring to Figure 4, the system 400 comprises: one or more sensors 112 for detecting an obstruction in the bowling ball return device; means 402 for, in response to detecting the obstruction on an accelerator belt of the bowling ball return device, turning off a motor of the accelerator belt of the bowling ball return device; and means 404 for, in response to detecting the obstruction elsewhere than on the accelerator belt of the bowling ball return device, maintaining the motor of the accelerator belt on.

**[0039]** In an embodiment, the system 400 is configured to perform all the steps of anyone of claims 2 - 12.

**[0040]** In one example, means for turning off the motor of the accelerator belt 402 and/or means for maintaining the motor of the accelerator belt on 404 may comprise a processing unit. The processing unit may be a part of the bowling ball return device or it may be a separate unit. The processing unit may be implemented by using a specific circuitry, such as a processing unit circuitry. For example, a specific circuitry may comprise at least one processor and at least one memory including a computer program code, wherein the at least one memory and the

computer program code are configured, with the at least one processor, to cause the system to carry out the procedures of Figure 2. On the other hand, said specific circuitry may be an ASIC or FPGA as described later.

**[0041]** In another example, the one or more sensors, when detecting the obstruction, generate a signal to the motor of the accelerator belt to turn off the motor or maintain the motor on. Hence, the signal may be generated, by the one or more sensors, directly to the motor and the separate processing unit may not be used. In an embodiment, a counter is used with the sensors. When the bowling ball is stopped in the operating range of the one or more sensors, the counter is started and after predetermined time the counter generates the signal to the motor to turn it off or maintain it on.

**[0042]** As used in this application, the term 'circuitry' refers to all of the following: (a) hardware-only circuit implementations such as implementations in only analog and/or digital circuitry; (b) combinations of circuits and software and/or firmware, such as (as applicable): (i) a combination of processor(s) or processor cores; or (ii) portions of processor(s)/software including digital signal processor(s), software, and at least one memory that work together to cause an apparatus to perform specific functions; and (c) circuits, such as a microprocessor(s) or a portion of a microprocessor(s), that require software or firmware for operation, even if the software or firmware is not physically present.

**[0043]** This definition of 'circuitry' applies to all uses of this term in this application. As a further example, as used in this application, the term "circuitry" would also cover an implementation of merely a processor (or multiple processors) or portion of a processor, e.g. one core of a multi-core processor, and its (or their) accompanying software and/or firmware. The term "circuitry" would also cover, for example and if applicable to the particular element, an application-specific integrated circuit (ASIC), and/or a field-programmable grid array (FPGA) circuit for the apparatus according to an embodiment of the invention.

**[0044]** It will be obvious to a person skilled in the art that, as the technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

## Claims

1. A method for controlling a bowling ball return device, comprising:

detecting, by using one or more sensors, an obstruction in the bowling ball return device;  
in response to detecting the obstruction on an accelerator belt of the bowling ball return device, turning off a motor of the accelerator belt of the

- bowling ball return device; and  
in response to detecting the obstruction elsewhere than on the accelerator belt of the bowling ball return device, maintaining the motor of the accelerator belt of the bowling ball return device on. 5
2. The method according to claim 1, wherein said elsewhere refers to a first ball entrance of a first bowling lane or a second ball entrance of a second bowling lane. 10
  3. The method according to any preceding claim, wherein the one or more sensors are positioned to detect the obstruction in the first ball entrance, the second ball entrance and the accelerator belt of the bowling ball return device. 15
  4. The method according to claim 3, wherein a first sensor is positioned to detect the obstruction in the first ball entrance, a second sensor is positioned to detect the obstruction in the second ball entrance and a third sensor is positioned to detect the obstruction on the accelerator belt of the bowling ball return device. 20 25
  5. The method according to any preceding claim, wherein the first and the second bowling lanes coupled with the bowling ball return device are closed when the one or more sensors detect the obstruction on the accelerator belt. 30
  6. The method according to any preceding claim, wherein the first bowling lane coupled with the bowling ball return device is closed when the one or more sensors detect the obstruction in the first ball entrance of the first bowling lane. 35
  7. The method according to any preceding claim, wherein the second bowling lane coupled with the bowling ball return device is closed when the one or more sensors detect the obstruction in the second ball entrance of the second bowling lane. 40
  8. The method according to any preceding claim, wherein the one or more sensors are positioned to detect a state of ball doors of the bowling ball return device. 45
  9. The method according to any preceding claim, wherein the one or more sensors are capable to recognize a pin in the bowling ball return device. 50
  10. The method according to any preceding claim, wherein an alarm is generated when detecting the obstruction in the bowling ball return device. 55
  11. The method according to claim 10, wherein the alarm
- is shown in a control unit of the bowling ball return device.
12. The method according to claim 11, wherein the alarm comprises information about the obstruction.
  13. A system for controlling a bowling ball return device, the system comprising:  
  
one or more sensors for detecting an obstruction in the bowling ball return device;  
means for, in response to detecting the obstruction on an accelerator belt of the bowling ball return device, turning off a motor of the accelerator belt of the bowling ball return device; and  
means for, in response to detecting the obstruction elsewhere than on the accelerator belt of the bowling ball return device, maintaining the motor of the accelerator belt of the bowling ball return device on.
  14. The system according to claim 13, wherein the system is configured to perform all the steps of anyone of claims 2 - 12.

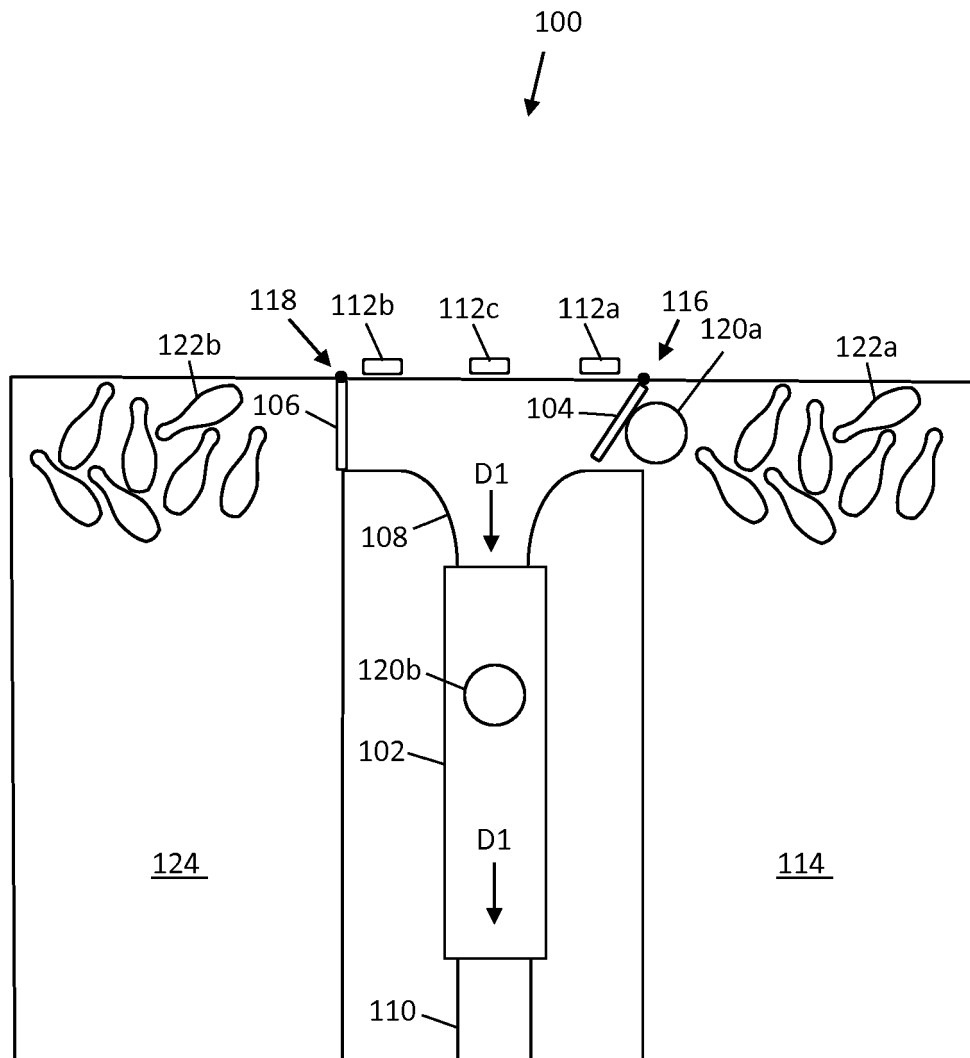


FIG. 1



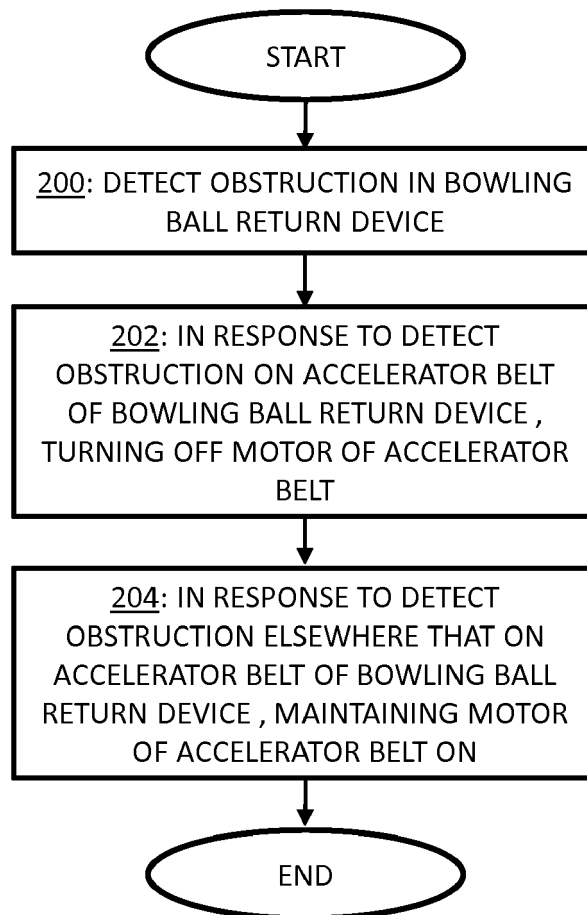


FIG. 2

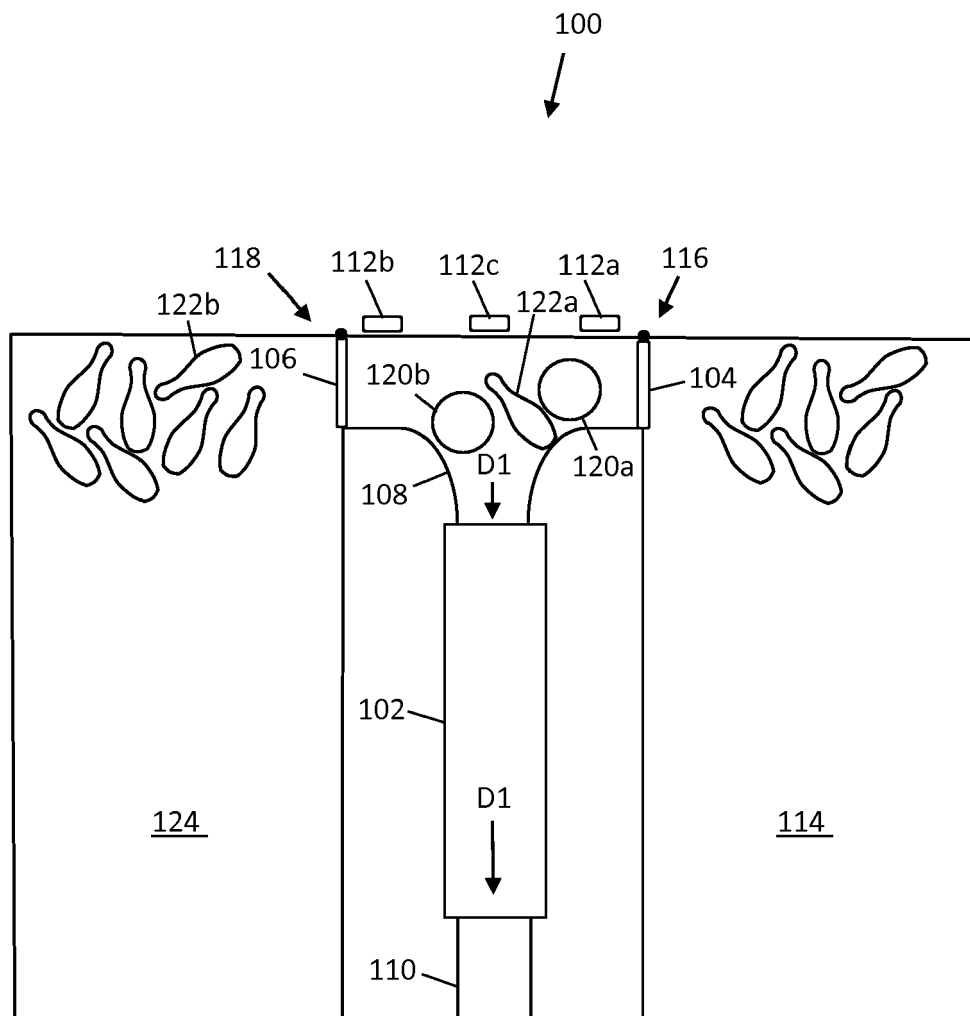


FIG. 3

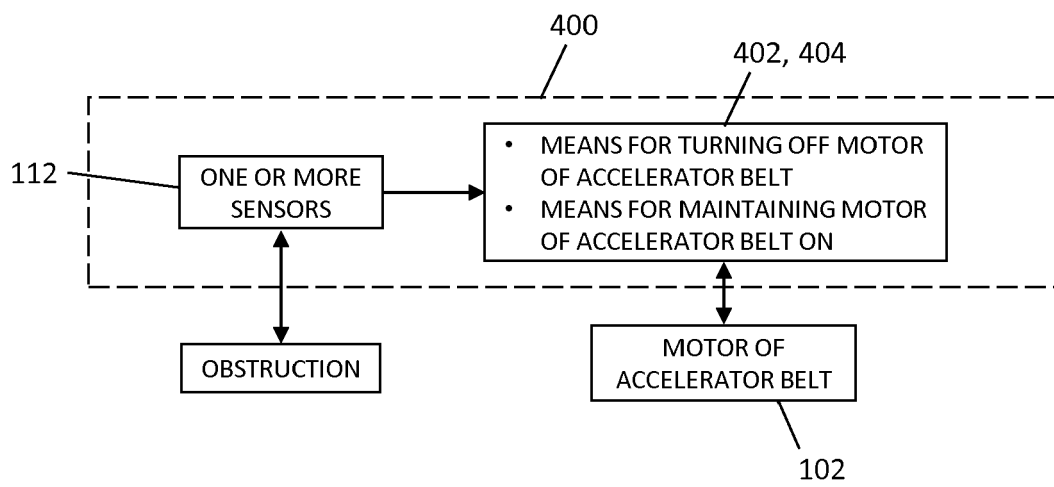


FIG. 4



## EUROPEAN SEARCH REPORT

Application Number  
EP 19 16 8838

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EPO FORM 1503 03.82 (P04C01)

| 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  | US 2017/336025 A1 (WARREN JR LEROY THOMAS [US] ET AL) 23 November 2017 (2017-11-23)  | 1-5,9-14  | INV.<br>A63D5/00<br>A63D5/02               |
| A  | * paragraph [0019] *<br>* paragraph [0027] *<br>* paragraph [0028] *<br>* paragraph [0040] *<br>* paragraph [0041] *<br>* paragraph [0042] *<br>* paragraph [0043] * | 6-8   |  |
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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