(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 398 211 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.07.2024 Bulletin 2024/28

(21) Application number: **24150559.3**

(22) Date of filing: **05.01.2024**

(51) International Patent Classification (IPC):
G07F 17/32 *(2006.01)* ***G07F 17/34*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
G07F 17/3297; G07F 17/3213; G07F 17/34

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **09.01.2023 GB 202300263**

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(54) ENTERTAINMENT MACHINE

(57) An entertainment machine 1 comprises an entry chute 10, a funnel 20, and a carousel 30 rotatable about a vertical axis, the carousel 30 having a plurality of receiving holes 31. In use, a ball 3is dispensed into the entry chute 10. The ball 3 rolls along the entry chute 10 to an exit end from where it drops on to the funnel 20. The ball 3 rolls across the surface of the funnel 20 until it drops through funnel aperture 21. The ball 3 then interacts with upper surface 32 of carousel 30 until it comes to rest in a receiving hole 31. As the carousel 30 rotates, the receiving hole 31 will eventually pass over an exit slot 41 provided in a fixed platform 40 below the carousel 30. The ball 3 will then drop through the exit slot 41. By detecting the drop of the ball 3 and the carousel 30 orientation when the ball 3 drops, a prize value associated with the receiving hole 31 which received the ball 3 can be awarded to a user.

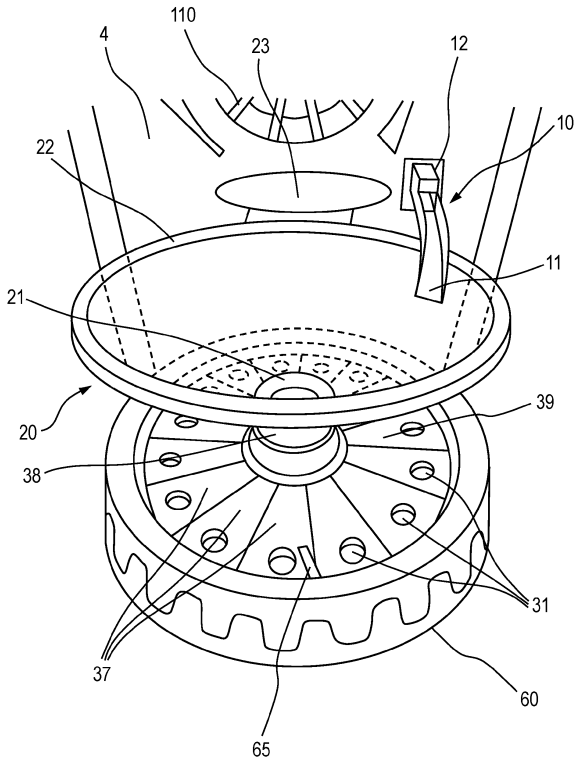

Fig. 2

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Description

Technical Field of the Invention

[0001] The present invention relates to entertainment machines. In particular the present invention relates to improvements in entertainment machines wherein prize values are determined by the movement of one or more playing tokens within the entertainment machine. Most particularly, the present invention relates to improvements in relation to the detection of token locations and hence associated prize values.

Background to the Invention

[0002] It is known to construct entertainment machines of the type whereby one or more playing tokens can be introduced into the entertainment machine. Interaction occurs between the playing token and fixed and/or moving elements until each token comes to rest at a particular location. If the resting location is a prize location, a corresponding prize value can be awarded. Typically, the playing tokens would subsequently be removed after the award of prize values.

[0003] In one example of a such an entertainment machine, inserted coins roll along a passage and are released onto a substantially conical funnel, with a central aperture. After rolling on the surface of the funnel, the coins drop through the aperture on to a horizontally rotating carousel having a substantially planar token receiving surface. The receiving surface is marked with a series of prize locations. As the carousel rotates, it passes under a linear array of photo sensors operable to detect coins at rest and determine whether said coins are lie within a prize location and then passes under an angled brush rod operable to sweep coins from the receiving surface into a collection chute.

[0004] Whilst such an apparatus does provide entertainment, the particular implementation does have some drawbacks. For instance, it is possible for one or more of the photosensors to become blocked by debris picked up during use. It is also possible for coins to become jammed between the roulette plate and photosensor array or sweeping rod. A further issue is that prize locations are marked visually, and prize values are only awarded if a coin rests clearly within the prize area. A user may become frustrated, if the photosensor array does not award prize value where a coin is partly or substantially resting on an award plate.

[0005] It is also possible that coins could drop between the sensor array and the sweeping rod and thus not be detected. Whilst this can be mitigated by offsetting the alignment of the funnel aperture, this can lead to a user perception of bias in coin drop locations.

[0006] It is therefore an object of the present invention to provide an improved entertainment machine that at least partially overcomes or alleviates the above issues.

Summary of the Invention

[0007] According to a first aspect of the present invention there is provided an entertainment machine comprising:

a funnel into which a ball can be dispensed, the funnel having a lower aperture through which a ball can drop;

a carousel provided below the funnel, the carousel rotatable around an upright axis over a platform, the carousel comprising a plurality of receiving holes for receiving a token, each said receiving hole extending between an upper surface and a lower surface of the carousel;

the platform comprising an exit slot through which a ball can drop, the exit slot positioned such that as the carousel rotates relative to the platform, each receiving hole is brought into alignment with the exit slot such that a ball in the receiving hole can drop through the exit slot; and

a sensor arrangement operable to detect a ball dropping through the said exit slot and the carousel orientation as the said ball drops through the exit slot.

[0008] By providing receiving holes in which a ball is received and detecting the ball subsequently dropping from the receiving hole through the exit slot, the ball position prior to dropping is readily determined. Such an arrangement is simple and robust. Furthermore, the receiving and subsequent dropping of the ball from the receiving hole is unambiguous to a user, reducing potential frustration with the machine.

[0009] The entertainment machine may comprise a control unit. The control unit may comprise a microprocessor. The control unit may be operable in response to the sensor arrangement to determine, based on the carousel orientation, that a token, in the form of a ball was received in a particular receiving hole. The control unit may be operable to thereby award prize value. In some embodiments, the awarded prize value may be the same for each receiving hole. In other embodiments, the awarded prize value may vary for different receiving holes. The prize value of each receiving hole may be marked on the upper surface of the carousel in the vicinity of each receiving hole.

[0010] In some embodiments, a bonus game may be activated by the determination by the control unit that a ball was received in a particular receiving hole. In other embodiments, the bonus game may be activated in response to awarded prize value exceeding a threshold value. The bonus game may take any suitable form. The bonus game may be provided on an upper panel of the entertainment machine. In one example the bonus game may be a bonus wheel. In such bonus games, the bonus

wheel may comprise multiple sectors having different prize values. Such bonus games may involve rotating the wheel for a period and awarding prize value corresponding to the prize value of the wheel sector aligned with a pre-set location when rotation ceases.

[0011] In some embodiments, additional credit may be awarded by the determination by the control unit that a ball was received in a particular receiving hole. In other embodiments, addition credit may be awarded in response to awarded prize value exceeding a threshold value.

[0012] The carousel may be provided with a co-rotating base plate. In some embodiments, the base plate may be fitted to the lower surface of the carousel. In other embodiments, the base plate may be provided on a common axle or a common rotation axis to the carousel. In such embodiments, the base plate may be provided below the platform. The base plate may comprise a disc having a toothed outer edge. In such embodiments, teeth or gaps between teeth may be aligned with the receiving holes. In some such embodiments, each tooth or gap may be aligned with a receiving hole. In other embodiments only some teeth or holes are aligned with a receiving hole. This arrangement beneficially allows for variable receiving hole spacing. In such embodiments, the carousel orientation sensor may be operable to detect the teeth. By maintaining a running count of the detected teeth carousel orientation can be determined.

[0013] The upper surface of the carousel may be divided into multiple different sectors. Each sector may comprise a single receiving hole. In some embodiments, some sectors may comprise multiple receiving holes. The radial extent of each sector may be substantially equal. In other embodiments, the radial extents of each sector may vary.

[0014] The upper surface of the carousel may be sloped towards an outer edge. In such embodiments, the receiving holes may be provided in the vicinity of the outer edge of the carousel. This beneficially urges balls incident upon the carousel towards the receiving holes. Each receiving hole may be provided at the same radial separation from the rotation axis of the carousel. This can ensure that each receiving hole will interact with the exit slot in the same manner.

[0015] In some such embodiments, the surface of each sector may slope away from the closest radial boundary of the sector. In such embodiments, the receiving holes may be substantially centrally aligned with the central radial axis of the sector. This beneficially urges balls incident upon the carousel sector towards the receiving holes.

[0016] The upper surface of the carousel may comprise a central projecting boss. The boss may be aligned with the rotational axis of the carousel. The boss may have a substantially dome like form. Beneficially, this causes the boss to direct incident balls outwardly towards the receiving holes of the carousel.

[0017] An upwardly projecting outer wall may be provided around the outer edge of the carousel. The wall can beneficially block balls from being directed outwardly of the carousel. In some embodiments, the outer wall can be an integral feature of the carousel. In other embodiments, the outer wall may project upwardly from the platform.

[0018] The outer wall may be adapted to block balls from rolling off the outer edge of the carousel. In some embodiments, the receiving holes may be provided sufficiently close to the outer edge of the carousel that a ball in contact with the outer wall will fall into a receiving hole as the carousel rotates past the outer wall.

[0019] A brush rod may be provided at a fixed position over the upper surface of the carousel. The brush rod may have a separation from the upper surface less than the maximum size of a ball. Accordingly, as the carousel rotates, any ball resting on the upper surface of the carousel outside a receiving hole may impact upon the brush rod. This can urge the ball to come to rest in a receiving hole. Additionally, any ball significantly projecting from a receiving hole may be urged into the receiving hole. In some embodiments, the brush rod can be positioned relative to the exit slot such that balls are urged to or into receiving holes immediately prior to the receiving hole being aligned with the exit slot. The brush rod can thereby help ensure balls drop through the exit slot.

[0020] In embodiments where the outer wall projects upwardly from the platform, the brush rod may project inwardly from the outer wall.

[0021] The sensor arrangement may comprise a ball drop sensor and a carousel orientation sensor. The carousel orientation sensor may be operable to output a signal indicative of the carousel orientation in response to detection of a ball dropping by the ball drop sensor. Alternatively, the carousel orientation sensor may be operable to output signals indicate of carousel orientation regularly.

[0022] The ball drop sensor may be an optical sensor, infrared sensor, magnetic sensor, camera or radio frequency identification (RFID) sensor as appropriate. In one embodiment, the ball drop sensor may be an optical or infrared sensor comprising an emitting element operable to output a beam and a receiving element operable to detect the emitted beam. In such embodiments, interruption of the beam by a dropping ball may be detected to determine that the ball has dropped.

[0023] The orientation sensor may be an optical sensor, infrared sensor, magnetic sensor, camera or radio frequency identification (RFID) sensor as appropriate. In one embodiment, the orientation sensor may be an optical or infrared sensor comprising an emitting element operable to output a beam and a receiving element operable to detect the emitted beam. In such embodiments, interruption of the beam by the teeth of the carousel base may be detected to determine orientation of the carousel. In such embodiments, the orientation sensor may be operable to maintain a running count of detected teeth to determine orientation.

[0024] In some embodiments, the sensor arrangement may additionally comprise an origin reference sensor. The origin reference sensor may be operable to detect a reference marker to determine a reference or origin orientation of the carousel. The reference maker may be fitted to the base plate at a refence location. In suitable embodiments, the origin reference sensor can be used to reset the running count of the carousel teeth. The origin reference sensor may be an optical sensor, infrared sensor, magnetic sensor, camera or radio frequency identification (RFID) sensor as appropriate. In one embodiment, the origin reference sensor may be an optical or infrared sensor comprising an emitting element operable to output a beam and a receiving element operable to detect the emitted beam. In such embodiments, interruption of the beam by the reference marker may be detected to determine orientation.

[0025] The funnel may have a substantially conical form. The funnel aperture may be aligned with the rotational axis of the carousel. In other embodiments, the funnel aperture may be offset from the rotational axis of the carousel.

[0026] The funnel may be formed from a substantially transparent material. This is beneficial since it allows a user to view the carousel through the funnel.

[0027] The machine may be provided with an entry chute through which a ball is introduced into a playing zone. The entry chute may comprise an elongate sloped passage. The entry chute may comprise a substantially liner passage or a curved passage. The entry chute may slope down to an exit end. The entry chute may be an enclosed or partially enclosed passage. In some embodiments, the entry chute is only partially enclosed at the exit end.

[0028] The entry chute may have an exit end that is offset from the aperture of the funnel. The entry chute may be aligned such that balls introduced to the funnel are initially directed tangentially to or away from the aperture of the funnel. This beneficially causes balls to travel across the funnel surface for an extended period before dropping through the aperture. This can increase user interest and excitement.

[0029] The balls may be formed from a substantially spherical plastic shell with a hollow interior. The balls may all be the same size. In other embodiments, the balls be of two, three or more different sizes. The balls may all be the same colour and/or have the same surface decoration. In other embodiments, different balls may have different colours and/or surface decoration. If the difference in colour/surface decoration can be detected by the sensor arrangement, the difference can be used to calculate prize value. In some embodiments, balls may comprise an implanted RFID device. If the ball drop sensor is operable to detect an embedded RFID device this can be used to calculate prize value.

[0030] Tokens dropping through the exit slot may pass to a collection hopper. In some embodiments, balls may drop directly into said collection hopper. In other embodiments, balls may pass to the collection hopper through an exit chute.

[0031] In some embodiments, a collection chute may be provided around all or part of the outside of the carousel. The collection chute may receive balls that are not received in the receiving holes. The collection chute may direct balls to the collection hopper.

[0032] The machine may be provided with a lift module. The lift module may be operable to lift balls from the collection hopper to the entry chute. In some embodiments, a ball reservoir may be provided between the lift module and the entry chute.

[0033] In some embodiments two or more collection hoppers may be provided. In such embodiments, each collection hopper may have a separate lift module. In such embodiments, separate entry chutes may be provided for each lift module. This can allow for balls to be introduced from different chutes so as to increase player engagement and excitement.

[0034] In embodiments where balls have a different size, different colour, different surface decoration or different RFID devices and two or more collection hoppers are provided, a sorting mechanism may be provided between the exit slot and the collection hoppers. The sorting mechanism may be operable to sort balls with particular characteristics such as different sizes, colours, surface decorations or RFID devices into different collection hoppers. This can allow balls with different characteristics to be recycled separately with the entertainment machine.

[0035] The entertainment machine may be provided with a credit input device. The credit input device may be operable to receive user credit input and output a credit signal in response thereto. The credit unit may comprise a coin reader, note reader, card reader, barcode reader, QR code reader or ticket reader as appropriate.

[0036] The control unit may be operable in response to the credit input device to enable ball dispensation.

[0037] The entertainment machine may be provided with a prize output device. The prize output device may be operable in response to the control unit to enable output of prize value to a user. The prize output device may be a coin dispenser, note dispenser, ticket printer or other printer as appropriate.

[0038] The entertainment machine may be provided with a credit display unit. the credit display unit may be operable in response to the control unit to display a value indicative of current user credit. The current user credit may be calculated by the control unit in response to the credit input device and subsequent machine operation. The current user credit value may be equal to or related to the number of balls available to the user for introduction.

[0039] The entertainment machine may be provided with a prize value display unit. the prize value display unit may be operable in response to the control unit to display a value indicative of current user prize value. The current user prize value may be calculated by the control unit in response to the machine operation. In particular, this may

be calculated in response to detection of balls dropping from receiving holes. In suitable embodiments, the current user prize value may include prize value awarded by the bonus game.

[0040] The entertainment machine may be provided one or more user actuable input means. The input means may comprise buttons, switches, keypads, pointing devices, touch sensitive panels, touch sensitive screens or the like. The control unit may be operable in response to detected user input to vary entertainment machine operation.

[0041] In suitable embodiments, an entry end of the entry chute may be connected to the ball reservoir. A ball release mechanism may control the dispensation of balls into the entry chute. The ball release mechanism may be operable to dispense balls individually or in in groups. Where balls are dispensed individually, successive balls may be separated by a pre-set time interval. In some embodiments, a subsequent ball or group of balls may only be dispended once a previous ball drops through the exit slot. In particular embodiments, successive balls may only be dispensed in response to detection of user input.

[0042] The number of balls available to be dispensed may be related to the current user credit value. In some embodiments, the number of balls available to be dispensed may equal the user credit value.

[0043] The carousel may comprise one or more lighting elements between the upper and lower surfaces. The upper surface of the carousel may be at least partially transparent or translucent. This can allow the upper surface of the carousel to be backlit to highlight machine features. In some embodiments, the lighting elements may provide substantially steady lighting. In other embodiments, the lighting elements may provide variable lighting. This can beneficially highlight particular machine features or be triggered by particular machine actions, increasing user engagement and excitement.

[0044] The rotation of the carousel may be powered by a motor. Typically, the motor is an electric motor. In some embodiments, the carousel may rotate at a substantially constant rate. In other embodiments, the rotation rate of the carousel may be varied.

[0045] In some embodiments, the entertainment machine may be provided with more than one entry chute. In such embodiments, each entry chute may be provided with a dedicated ball release mechanism.

[0046] In some embodiments, the platform may comprise more than one exit slot. In such embodiments, the sensor arrangement may comprise a dedicated ball drop sensor for each exit slot. In such embodiments, a single carousel orientation sensor may be provided. Alternatively, a separate orientation sensor may be provided for each exit slot. In embodiments having multiple exit slots, a single brush rod may be provided, or separate brush rods may be provided for each exit slot.

Detailed Description of the Invention

[0047] In order that the invention may be more clearly understood one or more embodiments thereof will now be described, by way of example only, with reference to the accompanying drawings, of which:

Figure 1 is an entertainment machine according to the present invention;

Figure 2 is an enlarged view of the entry chute, funnel and carousel of an entertainment machine according to the present invention;

Figure 3 is a schematic block diagram of an entertainment machine according to the present invention;

Figure 4 is a schematic illustration of the ball recycling mechanism of an entertainment machine according to the present invention;

Figure 5a is a schematic illustration of the base plate of the carousel and sensor arrangement of an entertainment machine according to the present invention;

Figure 5b is a schematic illustration indicating the connection between the base plate and the carousel of an entertainment machine according to the present invention; and

Figure 5c is a schematic illustration illustrating the ball drop sensor of an entertainment machine according to the present invention.

[0048] Turning to the figures, an entertainment machine 1 comprises an external cabinet 2 within which is provided an entry chute 10, a funnel 20, and a carousel 30 rotatable about a vertical axis, the carousel 30 having a plurality of receiving holes 31. In use, a ball 3is dispensed into the entry chute 10. The ball 3 rolls along the entry chute 10 to an exit end from where it drops on to the funnel 20.

[0049] The ball 3 rolls across the surface of the funnel 20 until it drops through an aperture 21 at the base of the funnel 20. The ball 3 subsequently interacts with and moves across the upper surface 32 of carousel 30 until it comes to rest in a receiving hole 31.

[0050] As the carousel 30 rotates, the receiving hole 31 will eventually pass over an exit slot 41 provided in a fixed platform 40 below the carousel 30. The ball 3 will then drop through the exit slot 41. By detecting the drop of the ball 3 and the carousel 30 orientation when the ball 3 drops, a prize value associated with the receiving hole 31 which received the ball 3 can be awarded to a user.

[0051] As is shown more specifically in figure 3, this operation is implemented by a control unit 100, typically comprising a microprocessor.

[0052] A credit input unit 80 is operable to enable a user to input credit and to output a signal to the control unit 100 corresponding to the amount of credit input. The credit input device 80 may be of any suitable form known in the art. For instance, the credit input device 80 may

comprise a coin/note reader with associated coin/note storage. In other examples, the credit input device 80 can comprise a ticket reader, card reader or wireless payment module operable to receive payment from a ticket/voucher, bank/credit card, smartphone or the like.

[0053] The control unit 100 is operable to control a credit display 8 to display a current sum of user credits. When the current sum of user credits is positive and non-zero, the control unit 100 is operable to control a motor 120 (typically mounted below platform 40) to rotate the carousel 30. The carousel 30 might be rotated at a preset fixed rate in most embodiments, but the skilled person will appreciate that in other examples, the control unit may be operable to control motor 120 to vary the carousel 30 rotation rate.

[0054] The control unit 100 is operable to activate a ball dispensing mechanism 12 by means of which balls 12 can be dispensed into the entry chute 10. The number of balls 3 available for dispensing can be related or equal to the current credit value. The control unit 100 is operable to decrement the current user credit in response to each ball 3 dispensed.

[0055] The ball dispensing mechanism 12 can be set to automatically dispense balls 3 until no further credit remains. The dispensed balls 3 can be dispensed singly at regular intervals or in groups of two or more, at regular intervals or when a previous ball 3 drops through exit slot 41. In other embodiments, control unit 100 may be operable to cause the ball dispensing mechanism 12 to dispense one or more balls 3 in response to detection of user input via a user actable input means 70. The user actuable input means may comprise any suitable element including but not limited to buttons, switches, key pads, pointing devices, touch sensitive panels or displays.

[0056] Detection of balls 3 dropping through the exit slot 41 and detection of the orientation of the carousel 30 as the ball drops is carried out by a sensor arrangement 50. As illustrated, the sensor arrangement 20 comprises a ball drop sensor 51 operable to output a signal when a ball dropping through the exit slot 41 is detected. In response to the ball drop sensor 51, an orientation sensor 52 outputs a signal indicative of the carousel 30 orientation when the ball drop is detected. Optionally, as shown in figures 5a-5b, the sensing arrangement 50 additionally comprises an origin reference sensor 53 operable to detect a reference marker 34 on the carousel 30. This can be used to calibrate and/or rest the orientation sensor 52, if necessary.

[0057] The ball drop sensor 51, orientation sensor 52 and optional origin reference sensor 53 may comprise any suitable form of sensor including but not limited to optical sensors, infrared sensors, magnetic sensors, cameras or radio frequency identification (RFID) sensors as appropriate. One exemplary embodiment using optical sensors will be described further below in relation to figures 5a-5c.

[0058] In response to the output of the sensing arrangement 50, the control unit 100 is operable to determine which receiving hole 31 had received a ball 3 which has dropped through the exit slot 41. Accordingly, the control unit 100 can award a prize value associated with the receiving hole 31 to the user and control a prize display 9 to display a current sum of user prize value.

[0059] In some embodiments, the control unit 100 is operable to trigger a bonus game 110, either in response to particular prize value threshold or to detecting a ball 3 dropping through exit slot 41 from a particular receiving hole 31 associated with the bonus game. Figure 1 illustrates a wheel type bonus game 110 provided on back panel 4. Any prize value awarded during the bonus game 110 may be output on bonus game prize display 7. The control unit may be operable to add bonus game prize awards to the current sum of prize value for output on prize value display 9.

[0060] When the user credit is exhausted, the control unit 100 is operable to activate a prize output device 90 to enable output of any positive non-zero prize value to a user. The prize output device 90 may be of any suitable form known in the art. For instance, the prize output device 90 may comprise a coin/note dispenser, ticket printer or other device as appropriate.

[0061] As illustrated schematically in figure 4, balls 3 which drop through exit slot 41 pass through an exit chute 42 to a collection hopper 43. A lift module 44 is operable to lift balls 3 from the collection hopper 43 to the entry chute 10. Optionally, a ball reservoir 45 is provided between the lift module 44 and the entry chute 10. This facilitates recycling of balls 3 within the entertainment machine 1.

[0062] Turing to figure 2, the entry chute 10 comprises a passage running from a ball dispensing mechanism 12 to an exit end 11. Dispensed balls 3, roll along the entry chute and then drop onto funnel 20.

[0063] As can be seen in figure 2, the entry chute 10 is offset from the aperture 21 of funnel 20. This causes balls 3 to have a significant tangential velocity component relative to the aperture 21 when dropped on to funnel 20. This causes balls 3 to roll around the surface of the funnel 20 rather than dropping straight through the aperture 21, thereby increasing user engagement and excitement.

[0064] The funnel 20 is substantially conical with an upper rim 22. The rim 22 is attached to a bracket 23. The bracket 23 is mounted on a back panel 4 of the entertainment machine. The bonus game 110 can able be provided on the back panel 4.

[0065] The funnel 20 is substantially transparent which enables users to see the carousel through the funnel.

[0066] The carousel 30 has an upper surface 39 comprising a bulbous boss 38 aligned with the rotation axis. The boss 38 thus helps deflect balls 3 dropping from the funnel 20 towards the receiving holes 31.

[0067] Around the boss 38, the upper surface 39 of the carousel 30 slopes outwardly and is divided into a plurality of sectors 37. Each sector 37 is marked with an associated prise value (or bonus feature start indicia). In

this embodiment, each sector 37 contains a single receiving hole 31. In other embodiments, sectors 37 may be provided with multiple receiving holes 31. The surface of each sector 37 may optionally be shaped to help direct balls 3 to the receiving hole 31.

[0068] A fixed outer wall 60 fits around the carousel 30. The outer wall 60 blocks balls 3 from rolling off the outer edge of the carousel 30. The receiving holes 31 are sufficiently close to the outer edge of the carousel 30 that a ball 3 in contact with the outer wall 60 will fall into a receiving hole 31 as the carousel 30 rotates.

[0069] A brush rod 65 projects from the outer wall 60. This brush rod 65 is angled so as to urge any balls 3 not securely received in a receiving hole 31 into said receiving hole as it rotates past. In this instance, the brush rod 65 is located over the exit slot 41 so that it further helps balls 3 to drop through the receiving hole 31 and exit slot 41 as the carousel rotates past the brush rod.

[0070] Turning now to figure 5a, the carousel 30 is additionally provided with a base plate 36. The base plate 36 is fitted about a common rotation axis to the carousel 36 so as to rotate at the same rate as the carousel 30. As illustrated in figure 5b, this base plate 36 is provided on the opposite side of motor 120 to the carousel 30 and below platform 40. In alternative embodiments, with suitable accommodations to other components, the skilled person will appreciate that the base plate 36 could be provided in other locations such as directly mounted to the lower surface of carousel 30.

[0071] The fixing plate 36 is provided with a series of teeth 32 around its outer edge. The teeth 32 are regularly spaced and each receiving hole 31 is aligned with a particular tooth 32 or gap between successive teeth 32.

[0072] Turning back to figure 5a, the exemplary orientation sensor 52 comprises an optical emitting element 52a operable to output a light beam and an optical receiving element 52b operable to detect the emitted beam. Successive interruptions of the beam by passage of the teeth 32 between the elements 52a, 52b are detected as carousel 30 rotates. Since the number of teeth 32 on the base plate 36 is known, maintaining a running count of the detected teeth 32 enables the orientation of the carousel to be determined. In the exemplary implementation, the orientation sensor will output a signal in response to each interruption of the emitted beam to the control unit 100. This would then allow the control unit to maintain the count and determine carousel orientation from the maintained count.

[0073] As shown in the example of figure 5a, the fixing plate 36 is additionally provided with a reference marker 33 in the form of a projecting finger. The exemplary origin reference sensor 53 in this figure comprises an optical emitting element 53a operable to output a light beam and an optical receiving element 53b operable to detect the emitted beam. Passage of the refence marker 33 is detected by interruption of the beam between sensing elements 53a, 53b. When the reference marker 33 is detected, the origin reference sensor 53 can output an indicative signal to the control unit. As the reference marker 33 is provided at only one location on the base plate 36, this provides origin calibration for the count of the orientation sensor 52.

[0074] Between the periodic calibration provided by the origin reference sensor, the known alignment of particular receiving holes 31 with particular teeth 32 (or gaps between successive teeth 32) and the ongoing detected tooth count, the control unit 100 can readily and accurately determine the orientation of the carousel at the time any ball drop is detected by the ball drop sensor 51. Based on the determined origin, the corresponding receiving hole 31 can be identified and thus prize value associated with said receiving hole 31 can be credited to the user by the control unit 100.

[0075] Also shown in figure 5c is an example of ball drop sensor 51 which comprises an optical emitting element 51a operable to output a light beam and an optical receiving element 51b operable to detect the return of the emitted beam from a reflector (not shown). When a ball 3 drops through exit slot 41 it interrupts the return of the reflected beam. Accordingly, the ball drop sensor 51 can thereby output a signal indicative of ball drop to the control unit 100.

[0076] The one or more embodiments are described above by way of example only. Many variations are possible without departing from the scope of protection afforded by the appended claims.

Claims

1. An entertainment machine comprising: a funnel into which a ball can be dispensed, the funnel having a lower aperture through which a ball can drop; a carousel provided below the funnel, the carousel rotatable around an upright axis over a platform, the carousel comprising a plurality of receiving holes for receiving a token, each said receiving hole extending between an upper surface and a lower surface of the carousel; the platform comprising an exit slot through which a ball can drop, the exit slot positioned such that as the carousel rotates relative to the platform, each receiving hole is brought into alignment with the exit slot such that a ball in the receiving hole can drop through the exit slot; and a sensor arrangement operable to detect a ball dropping through the said exit slot and the carousel orientation as the said ball drops through the exit slot.

2. An entertainment machine as claimed in claim 1 wherein the entertainment machine comprises a control unit operable in response to the sensor arrangement to determine, based on the carousel orientation, that a ball was received in a particular receiving hole.

3. An entertainment machine as claimed in claim 2

wherein the control unit is operable to thereby award prize value and/or to activate a bonus game.

4. An entertainment machine as claimed in any preceding claim wherein the carousel is provided with a co-rotating base plate, the base plate comprising a disc having a toothed outer edge.

5. An entertainment machine as claimed in claim 6 wherein each tooth or gap is aligned with a receiving hole or only some teeth or gaps are aligned with a receiving hole.

6. An entertainment machine as claimed in any preceding claim wherein the upper surface of the carousel is divided into multiple different sectors, each sector comprising a single receiving hole.

7. An entertainment machine as claimed in any preceding claim wherein the upper surface of the carousel slopes towards an outer edge, the receiving holes provided in the vicinity of the outer edge of the carousel.

8. An entertainment machine as claimed in any preceding claim wherein an upwardly projecting outer wall is provided around the outer edge of the carousel.

9. An entertainment machine as claimed in any preceding claim wherein a brush rod, is provided at a fixed position over the upper surface of the carousel.

10. An entertainment machine as claimed in any preceding claim/ wherein the sensor arrangement comprises a ball drop sensor and a carousel orientation sensor.

11. An entertainment machine as claimed in any one of claims 15 to 17 wherein the sensor arrangement additionally comprises an origin reference sensor operable to detect a reference marker.

12. An entertainment machine as claimed in any preceding claim wherein the funnel has a substantially conical form, the funnel aperture being aligned with the rotational axis of the carousel.

13. An entertainment machine as claimed in any preceding claim wherein the machine is provided with an entry chute through which a ball is introduced, the entry chute having an exit end that is offset from the aperture of the funnel.

14. An entertainment machine as claimed in claim 21 wherein balls dropping through the exit slot pass to a collection hopper and a lift module is operable to lift balls from the collection hopper to the entry chute.

15. An entertainment machine as claimed in claim 21 or claim 22 wherein a ball release mechanism controls the dispensation of balls into the entry chute, the ball release mechanism operable to dispense balls individually, successive balls separated by a pre-set time interval or the ball release mechanism operable such that successive balls are dispensed, by the ball release mechanism in response to detection of user input via one or more user actuable input means.

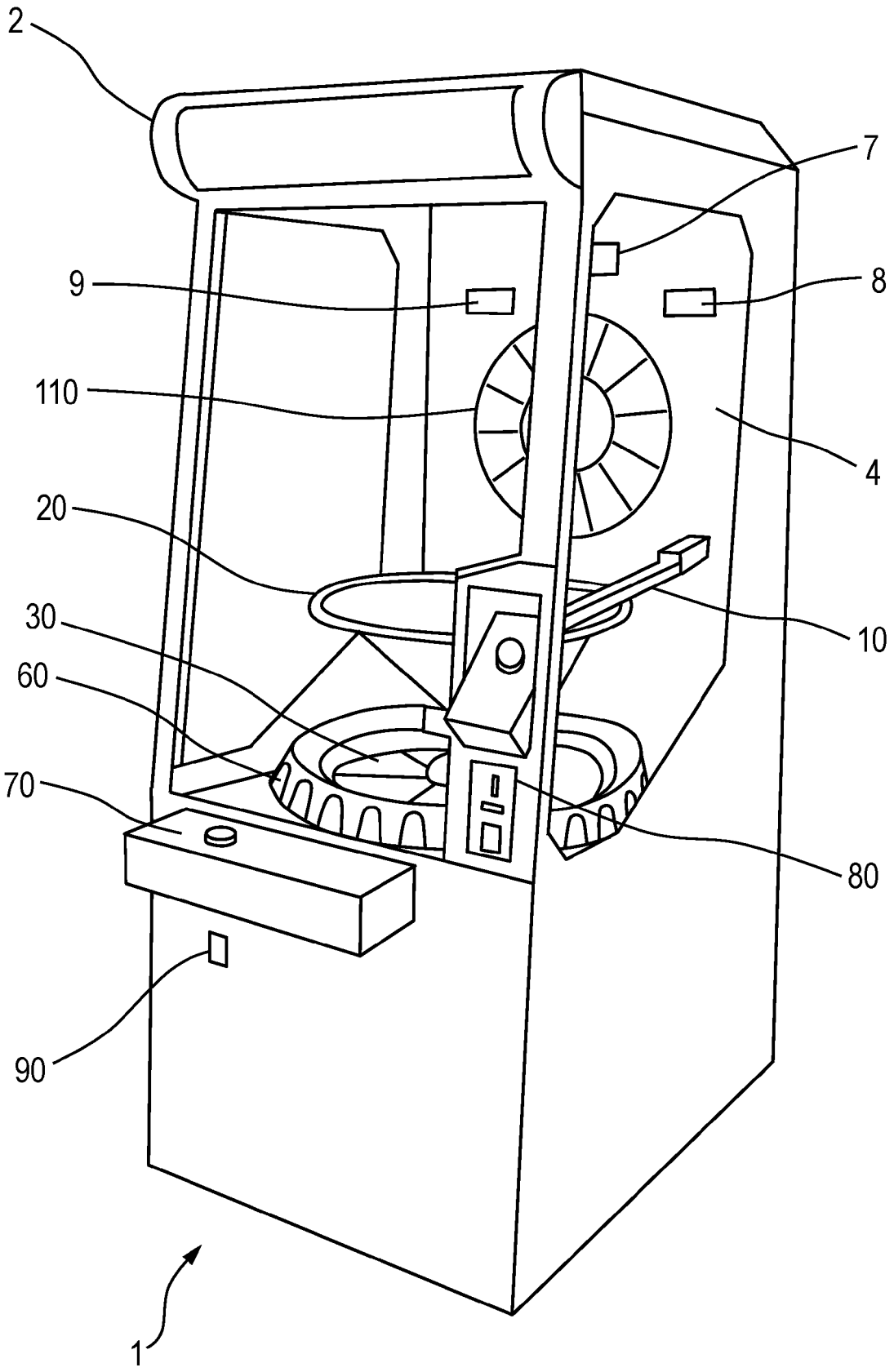

Fig. 1

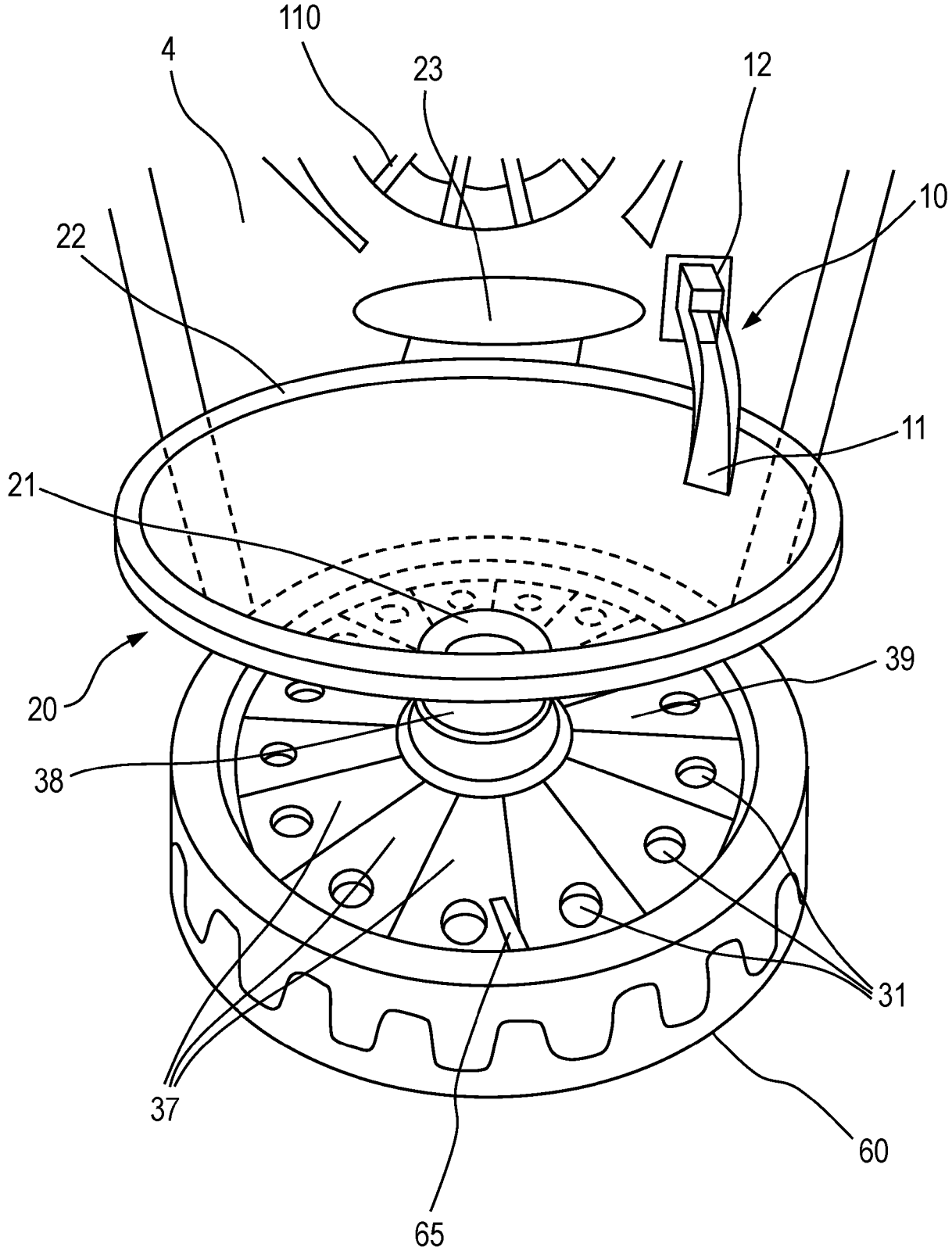

Fig. 2

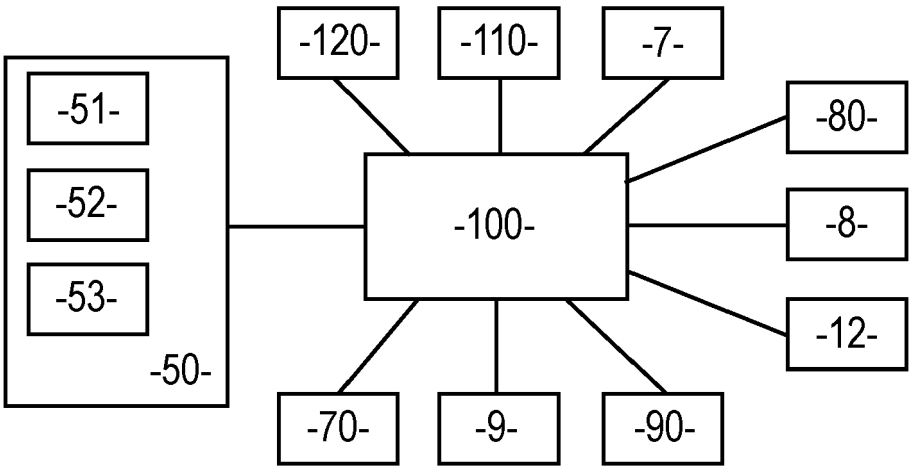

Fig. 3

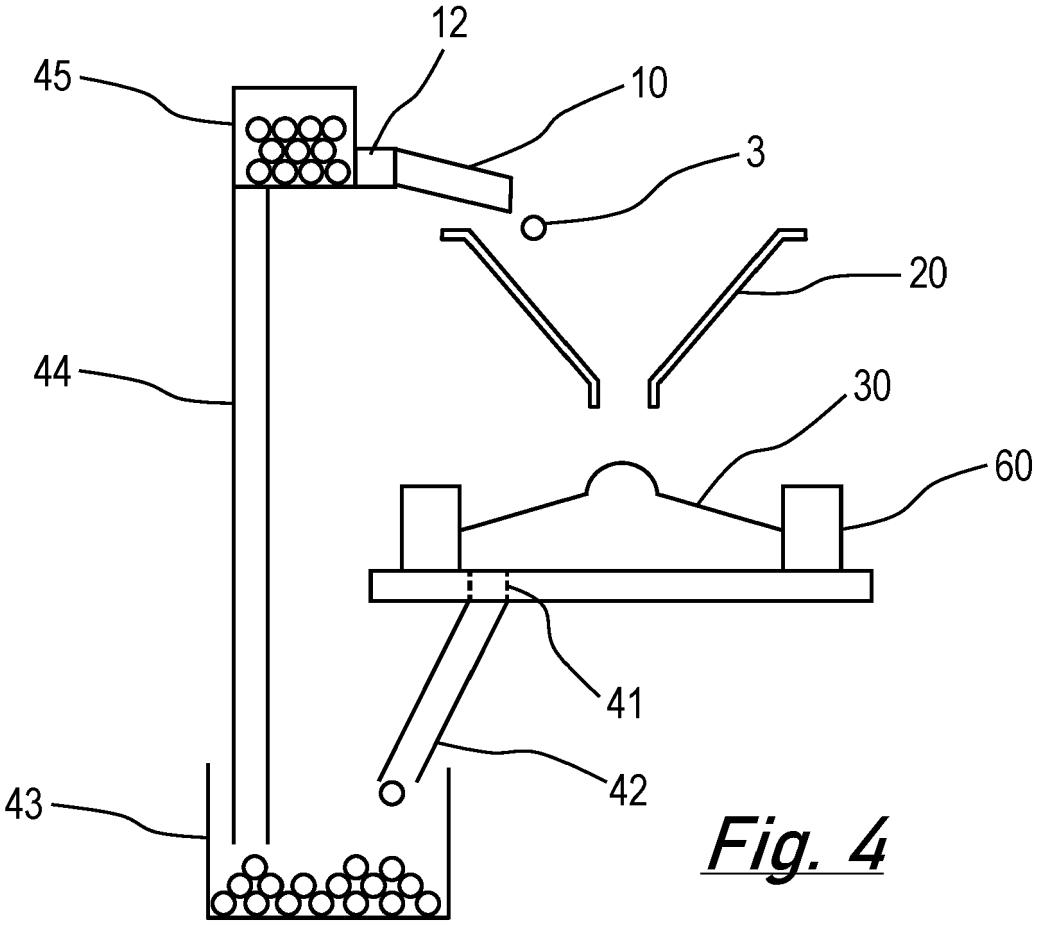

Fig. 4

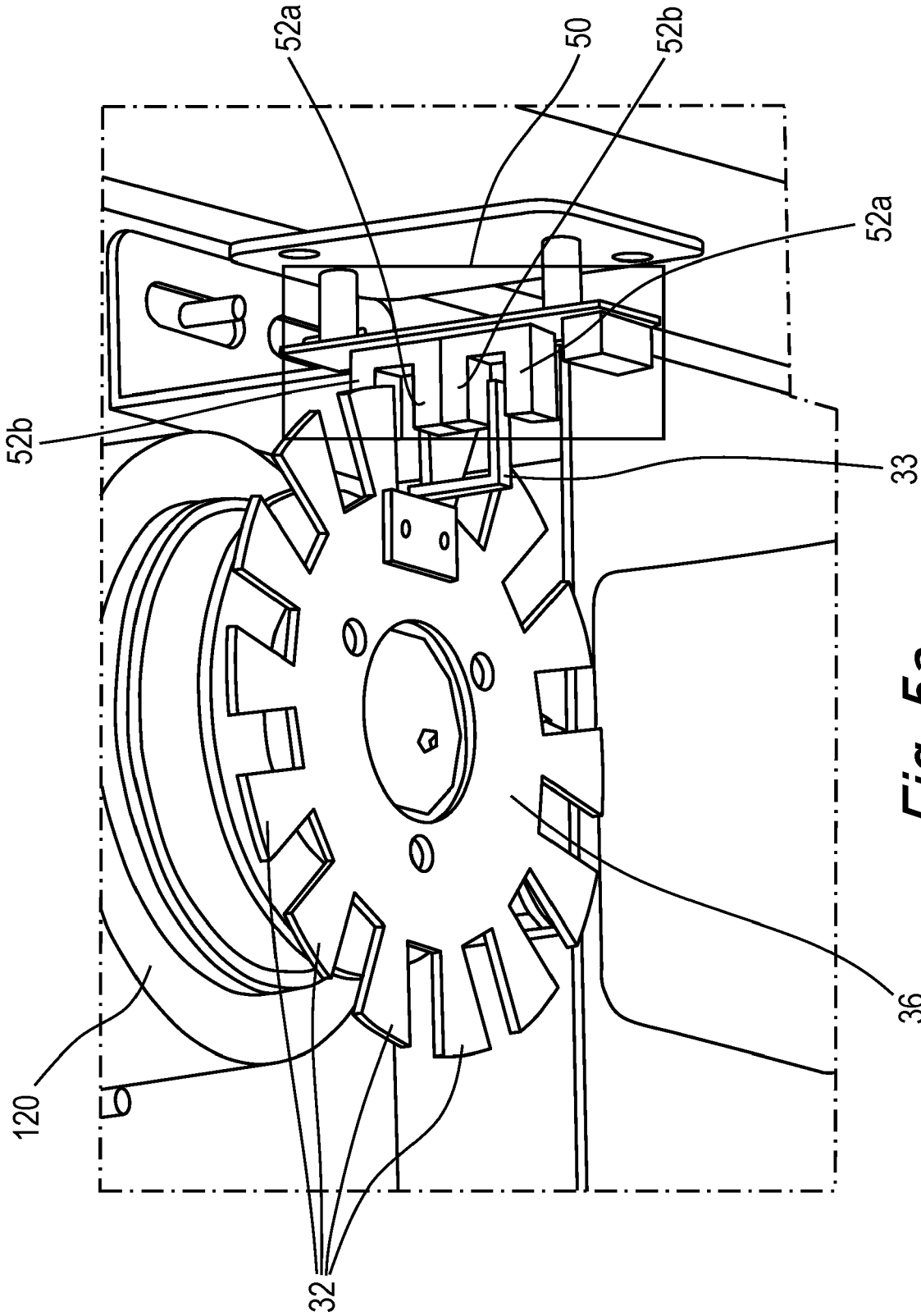

Fig. 5a

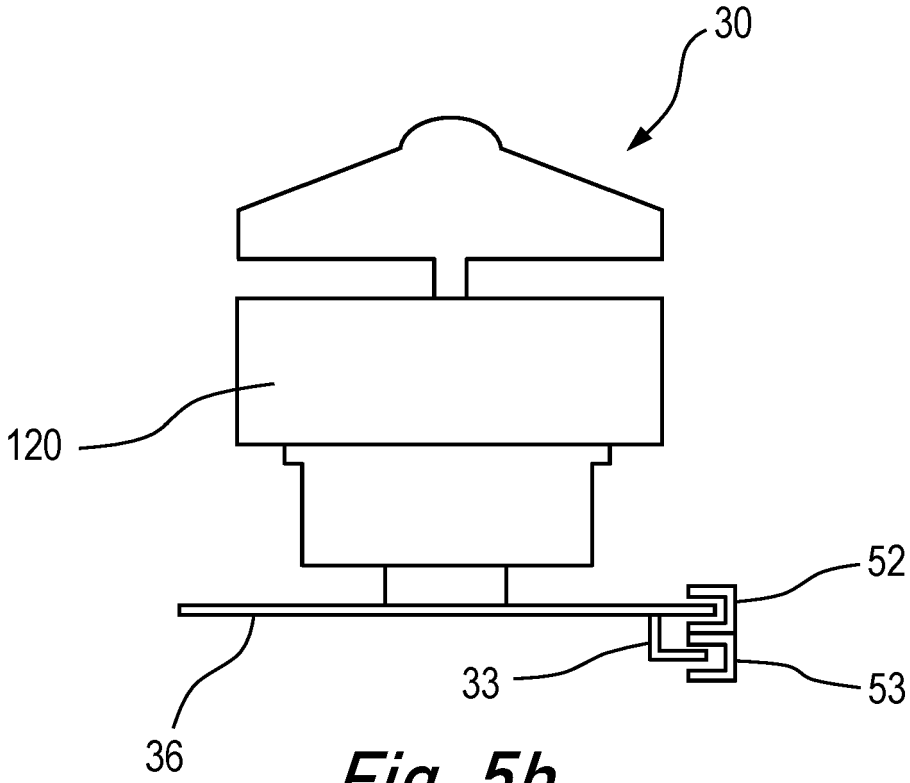

Fig. 5b

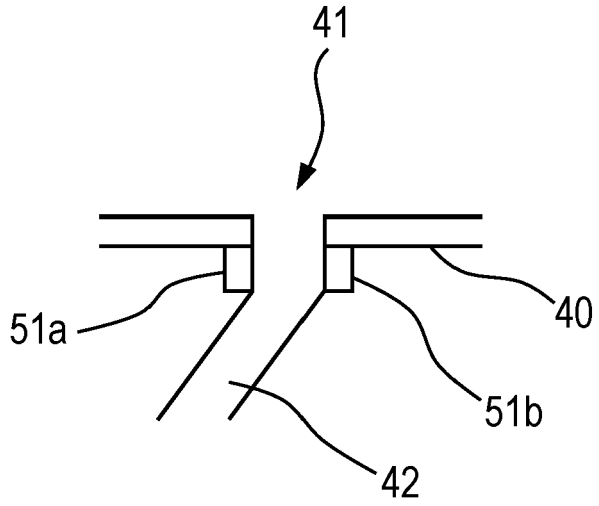

Fig. 5c

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EUROPEAN SEARCH REPORT

Application Number
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The Hague	28 April 2024	Wolles, Bart

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